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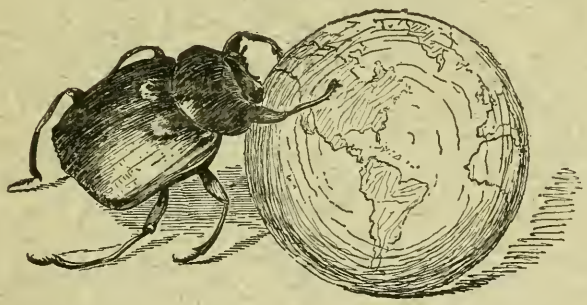

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NOTES ON SOME CICADAS FROM THE EASTERN AND CENTRAL UNITED STATES WITH A DESCRIPTION OF A NEW VARIETY OF CICADA PRUINOSA.[1]

By Wm. T. Davis,

New Brighton, Staten Island, N. Y.

Under the name *Rihana grossa Fabricius,* W. L. Distant in his Synonymic Catalogue of Homoptera, Part 1, Cicadidæ, London, 1906, includes as synonyms *Cicada marginata* Say (1825), *Cicada aulctes* Germar (1834), *Cicada resh* Haldeman (1852), *Cicada sonora* Walker (1850), *Cicada resonans* Walker (1850), *Fidicina literata* Walker (1850), *Cicada marginalis* Walker (1852) and *Fidicina figurata* Walker (1858). In using the specific name *grossa* for the largest cicada in the eastern United States Distant follows the synonymy suggested by Prof. Uhler in 1905.

It appears to the present author, however, after going over a considerable number of specimens accumulated during the past few years, that several of the names considered as synonyms really refer to very distinct species and he has here tried to clear up the matter to some extent. Mr. E. P. Van Duzee thinks that the generic name *Tibicen* should be used for the species here mentioned; they are placed under *Rihana* by Distant, as stated above. However, as they were

[1] The photographs of the species mentioned were made by Mr. Howard H. Cleaves, of the Staten Island Association of Arts and Sciences.

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nearly all first described under *Cicada,* we have here used that name, as any change is unnecessary for the object of this paper.

Cicada auletes Germar.
Cicada grossa Fabricius?

For a good life-sized figure of this species see Howard's "Insect Book," Plate XXVIII, fig. 19, where it bears the name of *C. marginata* Say. Smith and Grossbeck figure the genitalia of this species also under the name of *C. marginata* in their "Studies in Certain Cicada Species," Entomological News, April, 1907.

In Entomological News for March, 1905, Prof. Uhler has this to say of *Cicada grossa:* "This species has recently been brought to light in the British Museum, where, through the courtesy of Dr. G. R. Waterhouse, I was permitted to examine the types of Fabricius in the collection of Sir Joseph Banks. They proved to be two specimens of the large form of which I have specimens from North Carolina, Arkansas, Texas, Kansas, New York City, Northern New Jersey, Maryland and Virginia. . . . Variations in size, color and pattern of markings are, perhaps, responsible for the exaggerated synonymy which has accumulated upon this species."

Among the synonyms of *C. grossa* he places *Cicada marginata* Say (1825), *Cicada auletes* Germar (1834), and a number of species described by Walker in 1850.

The original description of *C. grossa* by Fabricius in 1775 is very general and would do for many of the large cicadas. He says, however, that the tarsi are black. In our insect they are olive green. He also gives the habitat as Brazil, but as Uhler says, this may be an error.

The next name on the list is *Cicada auletes* Germar, and there is no doubt about this being our species. He says the insect lives in Pennsylvania and he refers to the figure of the "great Indian Cicada" in the work of August Johann Rösel, "De Natuurlyke Historie der Insecten," Tab. XXV, fig. 5, where is shown a species a little over three inches in length. This of course is not our American insect but ours in size approaches it. Germar describes the pruinose condition of the insect, also its black and olive coloring, including the legs which he says are olivaceous. Of the operculum he says that it is "large, reaching middle of abdomen, oblong, with the sides subsinuate, apex obtusely rounded, olivaceous."

Our largest cicada can then be called *C. auletes* Germar with certainty, though possibly it should be called *C. grossa,* but Dr. Uhler's tendency in this group, to associate two or more species under one name is well known, and he may have been mistaken in this instance. At any rate it is narrowed down to one or the other of these names and *C. marginata* and *C. resh* should not be considered in the case as I hope to show.

Cicada auletes has a rather wide distribution and in the following records those marked with an asterisk are represented by specimens in the author's collection.

Brant Rock, Plymouth Co., Mass. (C. A. Frost). Collection Boston Society of Natural History.

Martha's Vineyard, Mass. Boston Society of Natural History, and Museum of Comparative Zoology, Cambridge, Mass.

New Haven, Conn. Collection Conn. Agri. Exp. Station.

Long Island, N. Y.,* July, Aug., Sept., Oct.

Staten Island, N. Y.,* July, Aug., Sept.

Manhattan Island, N. Y. City,* Sept. 8, 1910.

New Jersey,* Aug., Sept., Oct., particularly abundant in the sandy areas in the central and southern parts of the state.

District of Columbia, collection Am. Museum of Natural History.

Baltimore, Maryland.

Fairfax Co., Va.,* Aug. (C. R. Shoemaker).

Nelson Co., Va.,* July, Aug. (Col. Wirt Robinson).

Raleigh, N. C.,* July, Aug., Sept. (C. S. Brimley).

Lake Toxaway, N. C. (Mrs. Slosson).

Southern Pines, N. C., Aug. (A. H. Manee).

Clemson College, S. C., Aug. (M. P. Somes).

Altanta, Ga., July, Aug. (J. C. Bradley).

Bainbridge, Ga., Sept. (J. C. Bradley).

Mobile, Alabama,* Aug., Sept. (H. P. Loding).

Baton Rouge, La. (H. A. Morgan).

Mississippi.

Mountain Grove, Mo., Aug. (M. P. Somes).

Chetopa, Kans.,* July 24, 1914 (D. R. Beardslee).

Allegan, Mich., Aug. 19, 1913 (collected by F. Psota and in the collection of W. J. Gerhard). This is a male and looks just like specimens from New Jersey.

The author has forty specimens of this species in his collection and has seen many more, and they show hardly any variation. In fresh specimens the dorsal part of the abdomen at base and the three last segments are often pruinose, leaving four intermediate segments dark in color. The following measurements are taken from a male from New Jersey and a female from Staten Island, N. Y.

	Male, Mm.	Female, Mm.
Length of body	41	40
Length of fore wing	53	52
Expanse of wings	117	115

Cicada marginata Say.

This species was described from Missouri by Thomas Say in 1825 and was called *marginata* for the reason that the abdominal segments are yellowish on their posterior margins. The length of the insect is as he says "more than two inches and a quarter to the tip of the hemelytra," but it is not much more. The W-mark on the fore wings is absent or nearly so in this species, and the costal margin is somewhat bent near its central portion instead of being evenly rounded as in *Cicada resh*. It is also smaller and of a lighter green color than the olivaceous *auletes*. Uhler in his Preliminary Survey of the Cicadidæ of the United States, Antilles and Mexico, Trans. Maryl. Acad. Sci., 1892, says that the "W-shaped mark near the tip of the wing-covers" is sometimes absent in *Cicada tibicen* and that this is also the case "most commonly of all, with *C. auletes* Germ. (*marginata* Say)." He had probably been examining true *marginata* when he wrote this. The male genitalia are very different from *auletes*. The supra-anal plate is narrower and is without the three dorsal terminal points present in that species. Further the uncus when viewed in profile is narrowed to the rounded tip and not widened as in *auletes*. When viewed from behind, that is at full face, the uncus ends in a rounded point, whereas in *auletes* the end is notched.

As was stated in connection with the remarks on *C. auletes* and *C. grossa* the figure in Entomological News, Vol. XVIII, Pl. 3 is that of the genitalia of *Cicada auletes* and not of *Cicada marginata* as there stated.

The following specimens are in the author's collection:

Cincinnati, Ohio, Aug. 7, 1911, female (Chas. Dury).

Kentucky, Aug. 28, 1902, male (Chas. Dury).

Wakefield, Clay Co., Kansas, male and female (J. C. Warren).

Chetopa, Labette Co., Kansas, July, 1 male, 3 females; Aug., 6 males, 4 females (D. R. Beardslee).

In the collection of the Museum of Comparative Zoology there are two females from Texas and a male marked "Florida (Miss Willard)."

Walker in his List of Homoptera, Vol. IV, p. 1128, 1852, changes Say's *marginata* to *Cicada marginalis* "to distinguish it from *C. marginata* Olivier." This last is now *Ariasa marginata* Oliv. according to Distant. It is a Brazilian species.

Cicada resh Haldeman.

This species was described from the Great Salt Lake Valley by Prof. S. S. Haldeman in the appendix to the report on the Exploration and Survey of the Valley of the Great Salt Lake of Utah, Washington, 1853.

In the author's collection there are seventy-six specimens identified as this species. They are from Louisiana, Texas and Oklahoma and are like in markings the specimen figured by Haldeman on Plate IX of the report referred to. In fresh specimens the pronotum is green with the "narrow Y-shaped line divided to the base, a narrow transverse lateral spot on each side posteriorly and another anteriorly, immediately behind the lateral stemmata. Mesonotum black, with a large lateral elongated yellow spot [green in fresh specimens], and a pair of similarly colored medial spots in the shape of the Hebrew letter *resh* inverted, and the points converging anteriorly upon the medial line." The usual W-shaped mark is present on the fore wings. In the male the supra-anal plate ends in three points as in *auletes*, but the central one is not as long and prominent as in that species. The uncus when viewed in profile is broadened and rounded at the extremity, and when viewed at full face the end is shallowly notched, but not as deeply as in *auletes*.

Haldeman gives "length of the body fourteen, to the end of the upper wings twenty-two lines, width of the prothorax seven lines." Most of the specimens in the author's collection are a trifle over these measurements, but they are from further south than the type locality.

Marksville, Avoyelles Co., La., Sept. 15, 1912, 1 male and 1 female.

Houma, Terre Bonne Co., La., July, 1914, 2 males and 4 females (E. C. Wurzlow).

Port Hudson, Miss, male, collection Mus. Comp. Zoology.

Elgin, Comanche Co., Oklahoma, July, 1914, 1 male and 1 female (Alanson Skinner).

Washunga, Kay Co., Oklahoma, July, 1914, 1 female (Alanson Skinner).

Orange, Orange Co., Texas, July, 1914, 5 males, 8 females; August, 3 males, 4 females; September, 21 males and 26 females (Miss McGill).

Cicada sonora Walker.

This species was described without locality by Francis Walker in 1850 in "List of the Specimens of Homopterous Insects in the Collection of the British Museum, Part 1, London, 1850." The wings are said to expand 60 lines, which makes it too large for anything but *auletes*. The markings as described do not agree, however, with those of that species.

Cicada resonans Walker.

This species was described in the same publication with *Cicada sonora*, and as with that insect no locality was given. Walker says in part: Body tawny with ferruginous tinge; head with a broad black band; face partly black; "scutcheon" of the fore-chest adorned with a very large obconical black stripe; borders mostly black; hind-scutcheon much widened and slightly waved on each side; middle-chest adorned with six black stripes, the second pair broader than the outer pair, narrower than the inner pair which are obconical; a large slightly cross-shaped black spot rests on the cross-ridge. Abdomen black above; legs tawny; fore thighs armed with three teeth of various size. Wings colorless; veins tawny; first and second cross-veins clouded with brown; primitive areolet faun-color; fore-flaps and the base of the hind-flaps gray with a buff tinge. Length of the body 18 lines; of the wings [expanse] 56 lines.

If the locality had been given as southeastern North America there would be little or no doubt as to which insect was described.

What he says about the fore femora being armed with three teeth of various sizes is of no importance, for some individuals of this species have three teeth, while others have but two.

The insect under consideration has often been identified as *Cicada bicosta* Walker, which was also described without locality. Distant, however, says this occurs in Mexico and Costa Rica, and in Biologia Centrali-Americana gives a figure of the insect on Tab. 3. This shows a smaller species than the one under consideration, with the hind borders of the abdominal segments ferruginous. Walker's original description of *Cicada bicosta* gives the length of body as 16 lines, and an expanse of wings of 48 lines, measurements too small for *resonans.* He also says that the hind borders of the abdominal segments are ferruginous, "middle-chest adorned with four black obconical stripes," instead of six as in *resonans,* and the "hind flaps" of the wings "at the base and fore-flaps brown," instead of "gray with a buff tinge."

I may add to the description of what I take to be *resonans,* that in the male the supra-anal plate is broad and ends in three points, as in *auletes* and *resh;* the uncus when viewed in profile is broad at the tip and shaped somewhat like a horse's hoof; when viewed from the back or at full face, the extremity is broad and truncated and not notched. In some specimens it is very slightly sinuated.

In the author's collection there are twenty specimens that are covered very well both as to size and markings by Walker's description of *resonans,* and they can bear that name until a better one is found.

Southern Pines, N. C., 3 males, 6 females; July, August and September (A. H. Manee).

Spring Creek, Decatur Co., Ga., July 23, 1911, female (J. C. Bradley).

Ormond, Volusia Co., Fla., 2 females (Mrs. Annie T. Slosson).

La Grange, Brevard Co., Fla., 2 males, 6 females, July, August, September and October (Davis and Chaudoin).

Gulf Port, Hillsboro Co., Fla., 2 males (A. G. Reynolds).

Mobile, Alabama, 1 female (H. P. Loding).

In the collection of the Museum of Comparative Zoology there is a female from Port Royal, S. C. (Fowler), and a female, here referred to this species, from Kansas.

Fidicina literata Walker.

This species was also described by Walker in 1850 in "List of the Specimens of Homopterous Insects in the Collection of the British Museum, Part 1," and as with *resonans* no locality is mentioned. From size and description especially of the mesonotum it may be the same as *Cicada auletes*. The length of the body is given as 20 lines and the expanse of wings as 59 lines, which are a little large for *auletes*.

Fidicina figurata Walker.

This was described in 1858 in "List of the Specimens of Homopterous Insects in the collection of the British Museum, Supplement"; and as with several of the species already mentioned no locality is given. If it is North American it is probably either *Cicada lyricen* De Geer (1773) or *Cicada similaris* Smith and Grossbeck (1907). Walker says: "Prothorax reddish, black in front and behind, with a double tawny stripe, border tawny, with a black streak on each side. . . . Fore wings narrow, much acuminated. . . . Length of the body 17 lines; of the wings 44 lines." We understand that the wings expand 44 lines.

The fore wings are acuminate in both *lyricen* and *similaris*, particularly so in the latter; they both have the hind border of the prothorax black, and the size is right for either. The hind margin of the prothorax is green or olive in *auletes*, *marginata* and *resh* and the wings in these three spcies are not much acuminated, and *figurata* is also too small an insect to be considered the same as *grossa* or *auletes*.

Leaving the cicadas that have been more or less associated in the past with *Cicada auletes* or *grossa* we come to the consideration of *Cicada pruinosa* and its varieties.

Cicada pruinosa var. **latifasciata** new variety.

In their "Studies in Certain Cicada Species," Entomological News, April, 1907, Smith and Grossbeck drew up a description of *C. pruinosa* from the eight specimens from the coast of New Jersey in their possession, and in describing *C. winnemanna*, Bulletin of the Brooklyn Entomological Society, October, 1912, the writer followed their lead in considering these specimens typical of Say's species. However, in the last few years we have, through the kindness of

friends, accumulated a collection of about one hundred specimens of this species from Wells County, Indiana (E. B. Williamson), Hollister, Missouri (H. H. Knight), Falls City, Nebraska (H. G. Barber), Wakefield, Kansas (J. C. Warren), McPherson, Kansas (Warren Knaus), and Chetopa, Kansas (D. R. Beardslee). We have also examined many more in other collections including several from Texas. From this evidence it appears that the coast specimens, which have the stripe on the third abdominal segment comparatively broad, constitute a variety and cannot be considered typical with those from the interior of the country which have the stripe more attenuated or sometimes wanting. Of the variety we have collected about twenty in Cape May County, New Jersey; Mr. Francis Harper has sent us seventeen from the neighborhood of Beaufort, N. C., and a number of others have been examined in collections, from along the coast of New Jersey, and North Carolina, and two examples marked "Pennsylvania" are in the collection of the Academy of Natural Sciences of Philadelphia. In the collection of Mr. Otto Hiedemann there is a male of this variety from Victoria a town near the coast of Texas, and in the Uhler collection, U. S. Nat. Museum, there is a specimen collected by Belfrage in Texas.

Say says of *Cicada pruinosa:* "Found on the Missouri; it is also very common in Pennsylvania, and much resembles *C. tibicen* Fabr., but differs in being pruinose beneath, and in having white abdominal spots." Probably true *pruinosa* as well as the variety occurs in Pennsylvania, the latter being confined to the coastal region.

Cicada pruinosa was originally described in part as having the "tergum black: segments destitute of differently colored posterior margins, basal segment with a white pruinose spot each side of the back, another transversely elongated and attenuated one on the lateral base of the third segment, and another upon the lateral base of the caudal segment: venter dusky in the middle: caudal segments beneath testaceous, dusky near the middle tip."

Smith and Grossbeck say of the specimens they had from the coast of New Jersey and which we now know to be a variety: "Abdomen above black, base of first segment with a white, heavily pruinose lateral dash, which encroaches to some extent upon the second segment; a similar but longer and broader lateral dash extends along the base of the third segment and a spot of the same color is

on each side of the eighth segment. In the female the dash of the second segment differs from that of the male in not becoming attenuated dorsally, but in being squarely truncated."

For the variety thus described with the broad white lateral dashes on segment three, we propose the name of *latifasciata*. We then have *Cicada pruinosa* as described by Say, with the tergum entirely black or nearly so, with the attenuated white stripe at the lateral base of the third abdominal segment, being the form common from Indiana, Missouri, Nebraska, Kansas, etc., of which we figure a male from Chetopa, Kansas; *Cicada pruinosa* var. *latifasciata* so far known only from the coastal region of the eastern and southern United States, with the broad stripe on segment three and abdomen beneath more shining black, of which we figure a male from Cape May Co., New Jersey, and *Cicada pruinosa* var. *winnemanna* with the hind margins of the abdominal segments more or less fulvous, the second segment having the band broader than the others and a white streak generally hardly discernible each side at the base of the third segment, of which we figure a male from Plummer's Island, Maryland. The females of these cicadas have the charactertistic markings far less distinct than in the males and occasionally some are entirely absent.

Cicada pruinosa and its varieties approaches *C. linnei* Smith and Grossbeck in appearance more closely than any other of our species, but in *linnei* the fore-wings are abruptly bent near the middle, whereas in *pruinosa* the curve is more regular. The genitalia are about the same in both species. Their songs are not at all similar.

Seen in series *pruinosa* from Kansas has the costal margin of the fore wings evenly curved, whereas specimens from Indiana and especially var. *winnemanna* show a decided tendency to a sudden bend near the central portion of the costal margin.

EXPLANATION OF PLATES.

PLATE 1.

Fig. 1. *Cicada auletes* Germar.
Fig. 2. *Cicada resonans* Walker.
Fig. 3. *Cicada resh* Haldeman.

PLATE 2.

Fig. 1. *Cicada marginata* Say.
Fig. 2. *Cicada pruinosa* Say.
Fig. 3. *Cicada pruinosa* var. *latifasciata* Davis.
Fig. 4. *Cicada pruinosa* var. *winnemanna* Davis.

Cicadidæ.

Cicadidæ.

NEW SPECIES OF CICADAS FROM CALIFORNIA AND UTAH.

By WM. T. DAVIS,

NEW BRIGHTON, STATEN ISLAND, N. Y.

In preparing his Preliminary Review of the West Coast Cicadidæ, printed elsewhere in this JOURNAL, Mr. Edward P. Van Duzee examined a number of specimens from my collection and has very kindly suggested that I describe some of the new species. He has also been good enough to place in my hands some of the specimens described in the above mentioned paper, so that I might have them for comparison.

It is evident that there are a considerable number of species of cicadas in the states bordering the Pacific ocean many of which may best be treated of by comparison with *Okanagana rimosa* and *Okanagana synodica* described many years ago by Thomas Say from the middle west. Say's description of *synodica* is particularly good and the species has been easily identified from the Rocky Mountain region of Colorado, where it is quite abundant. Following this plan the descriptions here given often make reference and comparison to these two standard species.

Okanagana rubrovenosa new species.

Type male, Mariposa Co., California, June 15, 1914.

A little smaller than *O. rimosa,* slimmer and with proportionately narrower fore wings; color black and dark sanguineous. A strikingly handsome species.

Length 22 mm.; to tip of the wings 31 mm.; fore wing 8.5 by 26 mm. Head as wide as the anterior portion of the pronotum, front about as prominent as in *rimosa;* surface of the head between the eyes not deeply furrowed. Front convex, the median sulcus somewhat narrowed above, transverse rugæ about as prominent as in *rimosa.* Pronotum 3.5 by 8 mm., the sides parallel, or nearly so anteriorly; humeral angles shaped as in *rimosa,* with the wrinkles less prominent. Opercula oblique, sides sinuated. Last ventral seg-

ment long with the sides from about the middle nearly parallel to the truncated end. Valve of the male long, about as in *rimosa*. Uncus hooked at the end but not suddenly. Fore wings with the basal cell narrower than in *rimosa*. The dorsum in this species is black, but has a dull reddish appearance owing to its covering of rufus hairs. There is a dark red, narrow, broken line on the head just above the antennæ, and the hind margins of the pronotum, mesonotum and metanotum are also dark red. The X in the type is black, but in two of the paratypes it is dorsally touched with dark red. The mid-dorsal spots so general on the mesonotum of species of *Okanagana* are absent. Beneath nearly all black with a patch of silvery hairs each side at the base of the wings. The front is narrowly lined with dark red about the transverse rugæ. Fore femora black striped with dark red; the middle and hind femora and tibiæ more red than the anterior pair. Opercula edged with red, also the posterior margin of each abdominal segment. Uncus black, especially above; valve black on lower surface with the upper edge red. The red markings on the body are not at all conspicuous. Venation of all of the wings nearly uniform sanguineous, darkened and more spread out over the cells at base.

In addition to the type there are three paratypic males in the author's collection, all collected at the same time and place by Mr. Nunenmacher, and a small male from Napa Co., California, is in the collection of the American Museum of Natural History.

Okanagana mariposa new species.

Type male, Mariposa Co., California, June 16, 1914.

Larger than *rimosa* with rather narrow wings; largely black in color and decorated with orange.

Length 29 mm.; to tip of the wings 42 mm., fore wing 8 by 35 mm. Head as wide as the anterior portion of the pronotum; front about as prominent as in *rimosa;* top of head lacking the furrow present in *rimosa* on each side leading from the posterior ocellus toward the eye. Front convex, the median sulcus narrowed above, transverse rugæ about as prominent as in *rimosa*. Pronotum 5.5 by 11 mm., the sides anteriorly not quite parallel and edged with irregularly set teeth. (These might be reduced to sinuations in some specimens.) Humeral angles shaped as in *rimosa* with the wrinkles

about as prominent. Opercula oblique with the inner, lower angle not much produced. Valve 5 mm. in length. Uncus not hooked at the end, but very slightly narrowed, truncated and the end shallowly notched, thus different in shape from *rimosa* and No. 19 described in Mr. Van Duzee's paper referred to above. Venation and color of the wings about as in *rimosa* except that the bright or reddish orange is replaced by duller tints at the base of all of the wings, and the costa is greenish yellow. The dorsum of this species is nearly all black. The supra-antennal plates are touched with orange; the pronotum is narrowly edged with dull orange except on the anterior margin, and a very faint mid-dorsal streak of the same color extends to the outer edge from about its central portion. The mesonotum has the top of the X touched with pale orange and the four spots in front of the X are arranged in a semi-circle. The sides of the mesonotum are ornamented with orange at the base of the wings, two pale spots being particularly conspicuous. The posterior part of the metanotum is edged with orange. The dorsum of the abdomen has the posterior edge of the first and last segments narrowly streaked with greenish orange; the lower edge of the supra-anal plate and the upper edge of the valve are greenish orange; the uncus is black. The valve is greenish beneath and the lower surface of each abdominal segment is black edged on posterior margin and sides with light orange. The legs are orange streaked and spotted with black about as in *rimosa,* except that there is more black particularly on the fore femora.

The shape of the fore wings in *mariposa* is different from that of any other species of the genus I have seen in that the outer margin is not so evenly curved, but forms more of a straight line to the tip of the wing.

Okanagana hirsuta new species.

Type, female, Santa Rosa Island off the coast of southern California.

A hairy species, with particularly long hairs on under side and on the legs.

Length 25 mm.; to tip of the wings 37 mm.; fore wings 7 by 31 mm. Head nearly as wide as the anterior margin of the pronotum; front about as prominent as in *rimosa;* median sulcus narrow with parallel sides. Pronotum 4.5 by 10.5 mm., the sides anteriorly not

quite parallel and somewhat sinuated; humeral angles rounded; anterior angles prominent. Last ventral segment with the notch about half as deep as the segment is long and broadly V-shaped. The venation is the same as in *mariposa*, but the basal areole is clear instead of fuscous as in that species, *rimosa, vanduzeei,* etc. The costa is greenish yellow edged in part with black. There is the usual fuscous and orange colors at the base of all of the wings and the flaps are bright orange, on the hind wings clouded with fuscous. The dorsum of this species is black variegated with bright orange. Head black with the supra-antennal plates touched with orange; the pronotum is very narrowly edged with orange anteriorly and with a little broader band on the posterior margin and humeral angles; the slightly sinuated sides are black. The mesonotum has the orange spot on the top of the X divided by a black line and the four spots in front of the X are arranged in a semi-circle. The posterior margin is narrowly bordered with orange, and there are two orange spots at the base of each fore wing. The posterior part of the metanotum is edged with orange. The dorsum of the abdomen has all of the segments, except the basal one, narrowly edged on their hind margins with bright orange, the stripes being about obliterated along the median line. On the second segment the stripe is broader than on the others, but is absent dorsally. Beneath, the abdominal segments are black edged posteriorly with bright orange. All of the femora are striped with orange and black. The lower surface is thickly clothed with very long, light colored hairs, which are to be found even on the legs out to the tarsi; on the hind tibiæ they are about twice as long as its diameter. When viewed from above the hairs from the lower surface are seen to form a fringe about the body.

The female type in the collection of the American Museum of Natural History is the only specimen seen by the writer.

Okanagana triangulata new species.

Type male, Mendocino Co., California, May 10, 1910.

The triangular or obconical black area at the base of the abdomen is a conspicuous character of this insect. Length 21 mm.; to tip of the wings 25 mm.; fore wing 8 by 20 mm. Head small and narrower than the front margin of the prothorax; the front produced and a little blunter than in *synodica;* the supra-antennal plates with outer

edge nearly rounded, and the sulcus extending from the central ocilus backward to the posterior margins quite deep. The median sulcus on the front rather shallow and almost obliterated at its upper end; transverse rugæ as in *synodica*. Pronotum 3.5 by 8 mm., the sides not parallel but converging toward the eyes as in *synodica*, the humeral angles rounded, beyond a rather deep sinus extending about one half of the distance toward the anterior angles which are prominent and not so much bent downward as in *synodica*. Opercula oblique, sides sinuated. Last ventral segment with the base a little longer than the sides which converge to the truncated tip. Valve of the male broader and proportionately shorter than in *synodiça*. Uncus viewed in profile not hooked but with a sinuation near the tip not present in *synodica;* when viewed from above, produced into two points with a considerable intervening notch, instead of being truncated with a shallow sinuation as in *synodica*. Fore wings with the basal areole narrowed to an obliquely rounded apex; both pairs of wings suffused at the base with tetaceous; fore and hind flaps ornamented with bright orange. Veins of the fore wings testaceous, not fuscous beyond the middle as in *synodica*. The dorsum of this species is black and yellow sparsely covered with golden hairs. Head above with the elevations black except an extended spot of black on each supra-antennal plate; depressions pale. Pronotum except the anterior angles margined with pale particularly broad on the hind margin; the elevations mostly black, the pale color extending irregularly upward from the grooves on to the sides. Mesonotum black, edged behind and to the fore wings with orange; X black at center, edged with orange; four pale spots in front of the X arranged in a semicircle, and at the tip of each anterior line of the X there is a conspicuous, light yellow, impressed puncture. From the base of each fore wing there extends an oblong spot having a clouded central area. Metanotum with posterior edge dull orange. Dorsum of the abdomen with a basal obconical black area with the hind margin of each segment yellow and on the sides two rows of spots more or less incomplete. The last segment is all yellow with indications of two basal spots. Supra-anal plate not as deeply notched at the end as in *synodica*, black above edged with yellow below; uncus yellow. Beneath, the valve, also the abdominal segments entirely yellow.

except a conspicuous black line on the posterior margin of the first segment. Legs yellow, streaked and spotted with black.

The type was collected by Mr. Nunenmacher. In the collection of the American Museum of Natural History there is a female from Angel Island, California, that probably belongs to this species, though the basal areole of the elytra is not so narrowed to a rounded apex as in the male type. However, otherwise it appears to be the same. The last ventral segment has a broad V-shaped notch extending about half of the way to its base.

Okanagana mercedita new species.

Type male, Merced Co., California, June 18, 1914.

Length 19 mm.; to the tip of the wings 21 mm.; fore wing 6.5 by 17 mm. Head about as broad as the front margin of the pronotum, the front produced nearly as in *synodica;* supra-antennal plates with outer edge rounded. The median sulcus on the front rather broad, with the sides sinuated. Pronotum 3 by 7.5 mm., the sides not parallel, the humeral angles rounded and the anterior angles bent downward. Opercula oblique, sides sinuated. Last ventral segment with the base longer than the sides which converge to the rounded end. Valve is long as in *synodica* (5 mm.). Uncus when viewed in profile, hooked; when viewed from above narrowed toward the deeply notched apex. Fore wings with the basal areole oblong and square at apex; both pairs of wings more transparent than in *synodica* and *triangulata,* with the veins commencing at the transverse fold infuscated. Costa of the fore wings yellowish; all of the wings fuscous and bright orange at base; flaps bright orange. The dorsum of this species is blackish sparingly covered with light colored appressed hairs. Head above black with a light colored band in front of the anterior ocellus and extending on to the supra-antennal plates where there is an enclosed black spot over each antenna; a light spot on the median sulcus extends to the posterior margin. Pronotum with the central portion black except some of the grooves, and irregularly margined with pale except the hind margin which is more definitely banded. Mesonotum black with two light colored streaks on the anterior part being the exterior lines of the often present W-mark of some species; below these the X, which is light colored and joins on to the light colored band encircling the posterior

part of the mesonotum. At the tip of each anterior line of the X there is a black impressed puncture. Metanotum with posterior edge greenish yellow. Dorsum of the abdomen black with the segments narrowly edged with yellow except the last segment which is yellowish with a large irregular spot dorsally and a faint, narrow one each side. In the dorsal spot there are indications of two small included light spots at the base of the segment. Supra-anal plate dorsally black with the sides yellow. Uncus yellow shaded with brown, particularly at the tip. Beneath, the valve yellow, also the posterior margins of the abdominal segments, the last one having the entire central area yellow. Each ventral segment has two dark spots, one on each side of the central area. The opercula yellow touched with orange and black. Legs yellow streaked and spotted with black.

A paratypic female has the hind margin of the last ventral segment deeply notched almost to the base; the segment is pale with a black spot on either side; otherwise the female is colored as in the male.

In addition to the type and the female mentioned above, there are in the author's collection 16 males and 14 females, all from Merced Co., California. This series shows the transverse fold crossing the fore wings at the node, often considerably developed and in this respect approaching the much larger *Tibicinoides hesperius,* which it also resembles in color and markings more than it does *synodica.* Further the uncus is shaped much more like that of *hesperius* than *synodica,* the head, however, in form is more like the latter species. The outer row of cells in the fore wing are proportionately short in *mercedita,* whereas they are long in *hesperius* and *synodica.* The front in *hesperius* is usually margined on the upper surface by a well-defined elevated ridge.

Okanagana minuta new species.

Type from Stanford University, California, May 26, 1914.

The smallest *Okanagana* so far described.

Length 16 mm.; to the tip of the wings 18 mm.; fore wings 5.5 by 15 mm. Head not quite as broad as the front margin of the pronotum; the front produced as in *synodica;* supra-antennal plates anteriorly not much rounded. Median sulcus of the front broad. Pronotum 2.5 by 6 mm., the sides not parallel, the humeral angles

rounded and the anterior angles rather prominent. Opercula oblique with the apex turned inward as in *synodica*. Last ventral segment with the base longer than the sides which gradually converge to the rounded end. Valve 3.5 mm. in length. Uncus when viewed in profile hooked; when viewed from above narrowed toward the deeply notched apex. Fore wing with the basal areole oblong and square at apex; both pairs of wings more transparent than in *synodica*, with the veins commencing at the transverse fold infuscated. Costa of the fore wings yellowish; all of the wings fuscous and bridge orange at base; flaps bright orange. The dorsum of this species is blackish, covered with light-colored appressed hairs. Head above black with an irregular pale band before the eyes and a yellowish spot on each supra-antennal plate; a light spot on the median sulcus extends to the posterior margin. Pronotum with the central portion black with the yellow color of the grooves extending well upward; margined with yellow, that of the hind margin being particularly definite. Mesonotum black with the W-mark on the anterior part represented by its two outer lines, below these the X, which is black touched on the apex with pale; hind margin around to the wings, yellowish. At the tip of each anterior line of the X there is a conspicuous black impressed puncture surrounded by golden hairs. Metanotum with posterior edge greenish yellow. Dorsum of the abdomen black with all of the segments edged with yellow. Supra-anal plate dorsally black with the sides yellow. Uncus nearly black. Beneath, the valve pale, also the posterior margins of the abdominal segments, the last one being about one half pale. The opercula black broadly edged with pale.

In addition to the type I have examined 11 paratypic males all from the same place as the type and from Mr. Clarence H. Kennedy. Mr. Van Duzee has also sent to me a female from Fresno Co., Cal. (J. C. Bradley, Collector), that probably belongs to this species and which has the deep notch in the last ventral segment broadly U-shaped, instead of V-shaped as in *mercedita*. *Okanagana minuta* in some respects closely resembles *O. mercedita*, especially when large individuals of the one species are compared with small examples of the other, but when viewed in series the head of *minuta* is seen to be proportionately much smaller than that of *mercedita*. Thus in a large *minuta* and a small *mercedita*, each expanding about 38 mm.,

the head of the former measured across the eyes is 4.5 mm., and that of the latter is 5.5 mm.

Okanagana schaefferi new species.

Type, male, Bucksk Valley, Iron Co., Utah.

A large insect with very prominent front, larger than either *O. rimosa* or *O. vanduzeei,* but with the wings shaped as in those species. The colors and markings resemble those of *vanduzeei.*

Length 28 mm.; to the tip of the wings 38 mm.; fore wing 12 by 32 mm. Head not quite as broad as the front margin of the pronotum; front strongly produced, and the upper surface with a not very sharply defined broad elevated margin; front sulcus narrow. Pronotum 5 by 11 mm.; the humeral angles rounded and the sides evenly narrowed toward the anterior angles which are rounded. Opercula oblique with the ends not much turned inward. Last ventral segment with the base about as long as the sides which gradually converge to the truncated end which is slightly sinuated. Valve 4 mm. in length. Uncus when viewed in profile short, stout not hooked; when viewed from above, broad, widest in the middle, with the end truncate. Wings rather broad, transparent, and with the venation as in *rimosa* and *vanduzeei.* Costa of the fore wings yellowish. All of the wings fuscous and orange at the base; flaps orange, those of the hind wings a little fuscous. Head above black with a light spot on the edge of each supra-antennal plate. Pronotum black edged all round with orange and about one half of the median groove yellow. Mesonotum black with hind margin irregularly bordered with light orange; X orange, with a black central line and a black band across each anterior ridge followed by orange. Two very small orange spots beyond. A yellow dash near the base of each fore wing. Metanotum with the posterior edge light orange. Dorsum of the abdomen black with all but the basal segment posteriorly edged with orange; uncus black. Beneath, the valve pale orange; hind margins of all of the segments orange, except the last which is more than one half pale orange. The opercula black with the hind margins orange. Fore femora all black except the distal tips which are orange. Middle and hind femora black except the orange colored distal tips and inner surface. Rostrum black, orange at base, head black beneath, except the small orange spots about each antenna.

The type, in the collection of the Brooklyn Museum of Arts and Sciences is the only one I have seen. It was collected in 1904 by Messrs Doll & Engelhardt on sage brush. I take great pleasure in naming this species after Mr. Charles Schaeffer, of that Museum, who has always taken much interest in cicadas and with whom I have spent many pleasant days afield.

Okanagana fratercula new species.

Type, male, Bucksk Valley, Iron Co., Utah.

A small black and orange species, a little larger than *O. synodica* and with clearer wings. It in fact closely resembles *O. schaefferi,* but while that is a very large *Okanagana* this is a very small one.

Length 20 mm.; to the tip of the wings 26 mm.; fore wings 8 by 20 mm. Head not quite as broad as the front margin of the pronotum; front considerably produced and on the upper surface margined by a well-defined elevated ridge, front sulcus narrow. Pronotum 3 by 8 mm.; the sides not parallel, the humeral angles rounded; sides sinuated toward the anterior angles which are prominent. Opercula oblique with the ends turned upward. Last ventral segment with the base about as long as the sides which gradually converge to the rounded end. Valve 3 mm. in length. Uncus when viewed in profile short, stout, not hooked; when viewed from above, broad at middle tapering to the end which shows a depression but is not notched. Wings transparent with veins beyond the middle fuscous. Costa of the fore wings yellowish edged with fuscous. All of the wings fuscous and orange at base; flaps orange, fuscous centrally. Head above black, with a yellow spot on each supra-antennal plate. Pronotum black, entirely bordered with yellow, and about one half of the median groove faintly yellow. Mesonotum black with hind margin irregularly bordered with light orange; X orange, with a black band across each anterior ridge followed by orange. Two small orange spots beyond. The dorsal light spots taken together are arranged in a semicircle. A yellow dash next the base of each fore wing. Metanotum with the posterior edge light orange. Dorsum of the abdomen black with all but the basal segment posteriorly edged with orange; uncus black with a triangular orange spot at base. Beneath, the valve pale, brown at tip and black at base, hind margins of all of the segments orange. The opercula black tipped with orange.

Cicadidæ.

Fore femora all black except the distal tips which are orange; middle and hind femora black except the orange-colored distal tips and inner surface. Rostrum black, orange at base; head black beneath, except the small orange spots about each antenna.

The type is in the collection of the Brooklyn Museum of Arts and Sciences and is the only one I have seen. It was collected in 1904 by Messrs. Doll and Engelhardt on sage brush. *Okanagana fratercula* seems to be a "little brother" to *O. Schaefferi,* and perhaps bears about the same relationship to it as does *Tibicina cassinii* to *T. septemdecim* in the eastern states.

EXPLANATION OF PLATE 3.

Fig. 1. *Okanagana rubrovenosa.*
Fig. 2. *Okanagana mariposa.*
Fig. 3. *Okanagana hirsuta.*
Fig. 4. *Okanagana schaefferi.*
Fig. 5. *Okanagana fratercula.*
Fig. 6. *Okanagana minuta.*
Fig. 7. *Okanagana triangulata.*
Fig. 8. *Okanagana mercedita.*

A PRELIMINARY REVIEW OF THE WEST COAST CICADIDÆ.

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The following key and the appended notes include all of the species of the Cicadidæ known to me to occur in California, Oregon and Washington. Thirty-four species or named varieties are recorded from these states and two from farther east are included to complete the review of the distinctively western genera, *Okanagana* and *Cacama.* Structural characters are very few in some of the genera, notably *Okanagana,* and I have been obliged to fall back upon color characters in the preparation of the key. The color and markings while variable in extent are quite constant in their general facies for each species. So far as I have collected them I have found that most

of these forms are well distinguished by their songs and habitats. It is hoped that material may be available later for a more complete monograph of our west coast cicadas to which figures and full locality records may be appended.

In the preparation of this paper I have used my own material, taken mostly in San Diego Co., the fine series in the collection of Dr. Frank E. Blaisdell, those in the collection of the California Academy of Sciences, mostly taken by Dr. E. C. Van Dyke, and a few in the collection of the University of California, largely gathered by Prof. C. W. Woodworth. Other material has been received from Mr. E. O. Essig, Mr. C. L. Fox, and Dr. H. F. Wilson, the latter mostly from Oregon. Mr. Wm. T. Davis of Staten Island, New York, has sent me for comparison a very interesting series including the types of his new species described in a paper preceding this. I give first Prof. Woodworth's key for distinguishing the west coast genera by characters common to the two sexes.

Mesonotum completely covering the middle of the metanotum.
- Prothorax widest behind.
  - Abdomen tapering behind ..... *Tibicen.*
  - Abdomen rounded behind ..... *Cacama.*
- Prothorax widest at the middle ..... *Zammara.*

Metanotum conspicuous behind the mesonotum.
- Node in outer third of elytra ..... *Platypedia.*
- Node in middle third of elytra.
  - Posterior crossvein thickened ..... *Clidophleps.*
  - Posterior crossvein not thickened.
    - Median transverse suture of elytra not very evident across the cells ..... *Okanagana.*
    - Median transverse suture of elytra marked by a bend of the cell membranes and by pigment lines..... *Tibicinoides.*

In the above table the characters given opposite each name distinguishes that genus from all others in our fauna except *Tibicen* and *Okanagana* which are distinguished negatively and from each other by the mesonotal character given above. The former has the head nearly as wide as the thorax, an infuscated W-shaped mark near the apex of the elytra, a pentagonal basal cell in the elytra, and in the males covered tympana, in all of which characters it differs from *Okanagana.*

In the following keys I have employed so far as possible the characters used by Dr. Distant. The long areole lying along the costa beyond the node I have called the "marginal areole." It is the "first ulnar areole" of Dr. Uhler. The form of the uncus of the male is frequently distinctive and has been used in separating a number of the close species. This uncus is an ovate or oblong piece lying above and partly within the valve. Its main characters have been illustrated by Smith and Grossbeck in the April, 1907, number of Entomological News.

Tympanal coverings present in the male.....1
Tympanal coverings absent in the male.....Subfam. 3. *Tibiciniinæ*.

1. Tympanal coverings entirely concealing the orifices..Subfamily 1 *Tibicinæ*.
Tympanal coverings inperfect leaving the orifices more or less exposed.
Subfamily 2. *Cicadinæ*.

Subfamily 1. Tibicinæ (Cicadinæ of Distant).

Head including the eyes as wide as or wider than the mesonotum.
Tibicen Latr.
Head including the eyes little more than two thirds the width of the mesonotum .....*Cacama* Dist.

Genus 1. **TIBICEN** Latr.

Latreille, Fam. Nat. Regne Anim., p. 426, 1825.
Type *Cicada plebeja* Linn.

Opercules triangular, reaching to near the middle of the abdomen.
1. *cinctifera* Uhl.
Opercules broad, rounded at apex, reaching to the base of the first ventral segment .....2. *montezuma* Dist.

Genus 2. **CACAMA** Dist.

Distant, Ann. Mag. Nat. Hist., Ser. 7, XIV, p. 429, 1904.
Type *Proarna maura* Dist.

Larger (28 mm. to tip of abdomen), elytral venation mostly pale; two exterior transverse veins scarcely touched with fuscous; basal and apical segments of tergum pale, Colo. to Ariz. Not found in California.
valvata Uhler.
Smaller (22 mm. to tip of abdomen); elytral venation mostly black, two exterior transverse veins broadly black; basal and apical segments of tergum concolorous black except at outer margins..3. *crepitans* Van D.

Subfamily 2. CICADINÆ (GÆANINÆ of Distant).

Tribe **ZAMMARINI** Dist.

Pronotal margins ampliated and usually angulated.

Genus 3. **ZAMMARA** Am. & Serv.

Amyot & Serville, Hemipteres, p. 468, 1843.
Type *Tettigonia tympanum* Fabr.

Green varied with black, pronotal margins angulated; elytra with four costal and two commissural fuscous spots.....4. *smaragdina* Walk.

Subfamily 3. TIBICINIINÆ (TIBICINÆ of Distant).

Tympanal cavities and opercules of male rudimentary....4. *Platypedia* Uhl.
Tympanal cavities and opercules of male well developed.....1

1. Elytra hyaline, without a series of distinct supplementary transverse veins at the node.....2
Elytra smoky on basal one half, with a series of distinct supplementary transverse veins at the node.....7. *Tibicinoides* Dist.

2. Elytra distinctly bullate, the costa bent near the node; transverse vein at apex of the clavus much thickened, nodose.....5. *Clidophleps* n. gen.
Elytra normal, the costa gently arcuated to the node....6. *Okanagana* Dist.

Genus 4. **PLATYPEDIA** Uhler.

Uhler, Entomologia Americana, IV, p. 23, 1888.
Type *Cicada areolata* Uhler.

Costal vein strongly expanded and bent beyond the middle of the costal areole, this areole unusually broad (2 x 9½ mm.), marginal areole very narrow and linear, shorter than the first ulnar areole, apical areoles seven .....7. *ampliata* n. sp.
Costal vein simple, not at all angulated; marginal areole wider apically; apical areoles eight 1

1. Second ulnar areole (at apex of large costal areole) distinctly longer than broad; its inner margin straight or but feebly angled; the first transverse vein distinctly oblique; anterior margin of pronotum normally pale; length 17–22 mm. 2
Second ulnar areole nearly as long as broad, its inner margin distinctly angled at the second transverse vein; first transverse vein vertical; anterior margin of pronotum concolorous, black; length about 14 mm..3

2. Length 20–22 mm.; pale markings usually tinged with orange; base of vertex with a distinct pale point; first antennal joint pale at base; last ventral segment of male broad and almost truncated at apex; elytral nervures black from near their base.....10. *putnami* Uhler.
Length 17–20 mm.; pale markings usually tinged with greenish; no distinct

pale point at base of vertex; face and vertex long-hairy; last ventral segment of male long and almost conically narrowed at apex; elytral nervures pale almost to the transverse veins.....9. *areolata* Uhler.

3. Elytra proportionately broader (8–9 x 18 mm.); inhabits north of the Tehachapi .....8. *intermedia* n. sp.

Elytra proportionately narrow (6–7 x 15 mm.); inhabits south of the Tehachapi 4

4. Last ventral segment of female narrowly, deeply incised; valve of male long and tapering to its apex; elytral nervures pale brownish nearly to the transverse veins; inner margin of second ulnar areole obviously angled at second transverse vein.....5. *minor* Uhler.

Last ventral segment of female broadly deeply excavated; valve of male somewhat dilated toward its rounded apex; elytral nervures infuscated to their base; inner margin of second areole but slightly angled at the second transverse vein .....6. *aperta* n. sp.

Genus 5. **CLIDOPHLEPS** new genus.

Type *Okanagana distanti* Van D.

Proportionately narrow (length 19 mm., width of mesonotum 7 mm.); elytra narrower (8 x 23 mm.); costa but little angled at the node; nervures black, unusually strong; claval areole very narrow, acute at apex; last ventral segment of male narrower.....11. *blaisdelli* Uhler.

Proportionately broader (length 25 mm., width of mesonotum 9 mm.); elytra wider (10 x 26 mm.); costa more strongly angled at node; claval areole broader, obtuse at apex; last ventral segment of male broader (*distanti*) 1

1. Large (25 mm.); outer nervure of clavus and inner of corium pale to the node .....12. *distanti* Van D.

Smaller (22–23 mm.); elytral nervures pale to the apical areoles, the commissural only brown 2

2. Pale markings about as in typical *distanti;* last ventral segment of male truncated and more or less sinuated at apex..13. var. *truncata* Van D.

Pale markings more extended, the pronotum largely pale; last ventral segment of male narrower and scarcely emarginate at apex, about as in typical *distanti*.....14. var. *pallida* Van D.

Genus 6. **OKANAGANA** Dist.

Distant, Ann. Mag. Nat. Hist., Ser. 7, XVI, p. 23, 1905.

Type *Cicada rimosa* Say.

Larger, length (to tip of abdomen) 30–32 mm.; black, without dorsal pale markings; costa orange to tip of marginal areole..15. *cruentifera* Uhl.

Smaller; length not over 28 mm.....1

1. Small, length about 16 mm.; form eliptical; elytra short; front very prominent, scarcely longer than broad, rounding over and striate to its base, its sides regularly arcuated.....14

Larger, 18–28 mm.; front longer, its sides nearly straight and its base with a nearly horizontal superior area on which the transverse ribs become obsolete; costa more feebly arcuate.....2

2. Color rufo-ferruginous with a few marks on the vertex and a dorsal vitta on the tergum black .....17. *arctostaphylæ* n. sp.

Color black, more or less marked with pale or rufous.....3

3. Wing venation dark sanguineous; surface of body clothed with short scale-like hairs .....18. *rubrovenosa* Davis.

Wing venation black or pale, the costa and base orange or pale; vestiture of body if present pale 4

4. Pronotum and disk of the mesonotum dull black, immaculate; costal edge of the corium and commissure of the clavus bright reddish-orange; wing venation basally, legs and ventral segments in part orange; length 23 mm. .....16. *ornata* n. sp.

Hind edge of pronotum pale; disk of mesonotum with six pale marks, two on the calloused center of the X, two on its anterior points and two before these on the apex of the loops; all of these marks may be extended or reduced but are rarely absent.....5

5. Pronotum mostly black, when pale with the disk largely black but sometimes bisected by a pale median line.....6

Pronotum mostly pale with a black median vitta, geminate anteriorly, the lateral oblique grooves more or less broadly black; four anterior marks on the mesonotum coalescing; elytral venation greenish toward the base; length 25–27 mm. .....26. *vandykei* n. sp.

6. Somber black above with the pale marks much reduced; venter fulvous or reddish-orange, immaculate except at base; elytra long; length of body 25–27 mm. .....19. *tristis* n. sp.

More broadly marked with pale or if mostly black the venter black or banded with black 7

7. Larger, 20 mm. or over 8

Smaller, under 20 mm.; mostly pale beneath; elytral venation pale, at least at base; pronotum pale-margined 13

8. Mostly black, the pale markings greatly reduced and greenish; the black body conspicuously clothed with whitish pubescence; costa narrowly greenish; venter greenish, banded with black .....22. *canescens* n. sp.

Body when black not conspicuously whitish-pubescent 9

9. Mostly black above with black elytral venation; pronotum without pale lateral areas 10

Pale markings much extended with elytral venation mostly pale; lateral areas of pronotum largely pale 12

10. Length about 28 mm.; surface dull black, closely minutely grey-pubescent; valve of male long (5 mm.) as in rimosa; uncus oblong, parallel-sided, not narrowed toward the truncated apex .....20. *mariposa* Davis.

Length about 24 mm.; uncus of male more ovate, broadest near the base and narrowing toward the obtuse apex 11

11. Surface more polished, blue-black with orange-fulvous markings; the pronotum usually bordered all around with orange; male valve more elongated (4–5 mm.); narrow apex of its last ventral segment rounded; uncus without an apical hook ..... 21. *rimosa* Say.

Surface less polished, the pale markings reduced; pronotum with hind margin only pale; male valve shorter (3 mm.); apex of last ventral segment of male broader and sinuated; uncus hooked at apex.

23. *vanduzeei* Dist.

12. Head narrower (6 mm.); venter banded with black, at least on the connexivum; last ventral segment of male narrow and rounded at apex; uncus narrowed at apex, without a hook; inhabits eastern states.

25. *noveboracensis* Emm.

Head wider (7 mm.); venter pale, immaculate except at base and on apical segment of the female; last ventral segment of male shorter, truncate and sinuated at apex; inhabits California.

24. *vanduzeei* var. *consobrina* Dist.

13. Pale markings of the mesonotum extended, confluent, at least the anterior; head wider, 6½ mm. ..... 27. *californicus* Dist.

Four anterior pale marks of the mesonotum wanting or nearly so; head narrower, 5 mm. ..... 28. *striatipes* Hald.

14. Supra-antennal plates elliptical, its anterior edge transverse..... 15

Supra-antennal plates oblique..... 16

15. Basal areole of the elytra narrowed to a rounded apex.

29. *triangulata* Davis.

Basal areole of elytra parallel-sided, its apex rectangular.

30. *mercedita* Davis.

16. Length 15 to 17 mm.; anterior edge of the pronotum with a narrow linear callouse; male uncus with a rather long pointed hook.

33. *minuta* Davis.

Length 18 mm.; male uncus with an obtuse hook or without a hook.... 17

17. Anterior margin of pronotum broadly depressed, without a distinctly calloused linear edge; median apical area of pronotum rather acutely triangular ..... 31. *synodica* Say.

Anterior margin of pronotum with a linear calloused pale edge; median apical area of pronotum more broadly and obtusely triangular; male uncus with a short broad hook at apex..... 32. *uncinata* n. sp.

Genus 7. **TIBICINOIDES** Dist.

Distant, Ann. Mag. Nat. Hist., Ser. 8, XIV, p. 166, 1914.

Type *Tibicen cupreo-sparsa* Uhler.

Larger (20 mm.); lateral areas of pronotum with their grooves pale or rufous; mesonotum with pale marks at the anterior points of the X; venter pale, the basal segment only marked with black.

35. *hesperius* Uhler.

Smaller (15 mm.); pronotum black, the slender anterior and posterior edges only pale; mesonotum without pale marks at the anterior points of the X; venter black, the segments edged with pale.

34. *cupreo-sparsus* Uhler.

1. **Tibicen cinctifera** Uhler.
Uhler, Trans. Md. Acad. Sci., I, p. 156 1892 (*Cicada*).

This is recorded from New Mexico and northern California and Mr. Davis has sent me specimens from Arizona.

2. **Tibicen montezuma** Dist.
Distant Biol. Centr. Am., Homop., I, p. 8, pl. 2, fig. 2, 1881 (*Cicada*).

This species is unknown to me. It ranges from Mexico northward into New Mexico, Arizona and California as far as San Diego.

3. **Cacama crepitans** Van D.
Van Duzee, Trans. San Diego Soc. Nat. Hist., II, p. 45, 1914 (*Proarna*).

I know this species only from its type locality at San Diego. I have included the Rocky Mountain *valvata* in the key as it is likely to be found in the mountainous portions of this state.

4. **Zammara smaragdina** Walk.
Walker, List Homop., I, p. 33, 1850.

This species is included on the authority of Prof. C. W. Woodworth who reports a specimen labeled "San Diego." In the Museum of Comparative Zoology at Cambridge.

5. **Platypedia minor** Uhler.
Uhler, Entomologica Americana, IV, p. 81, 1881.

This distinct little species seems to be confined to the southern portion of the state where it is very abundant at times. It is found on grassy hillsides from the last of March to about the first of July where it may generally be found resting on the stems of the sage brush. It has a short peeping note which is difficult to locate. Dr. Uhler's measurements were taken from a large specimen and may refer to the form described below. In this species the front and lower surface is conspicuously clothed with long pale hairs, the anterior edge of the pronotum is concolorous and the elytral nervures are largely pale brownish to the cross veins. The male uncus is

broadly lanecolate and subacute at apex, its width about half the length.

6. **Platypedia aperta** new species.

A little larger than *minor* (about 16 mm. to tip of abdomen), with the elytral venation black and the inner margin of the second ulnar areole more rectilinear, scarcely more angled than in *areolata*. Here the last ventral segment is broadly triangularly excavated in the female and in the male broad at the slightly sinuated apex, the male valve is distinctly widened to its rounded apex, and the uncus is broad ovate, nearly as broad as long, with its apex subacute.

Described from seven males and two females taken by me at Alpine, June 8, 1913, and June 6, 1914, and one male from San Diego city, taken May 20, 1913.

7. **Platypedia ampliata** new species.

A little larger and less hairy than *minor* with much wider elytra, their costa obviously angled beyond the middle of the costal areole. Black, clothed with long blackish hairs which become grey beneath and on either side of the mesonotal X. Length 16 mm., expanse 38 mm.

Front strongly produced, the median sulcus deep; supra-antennal plates large and well rounded, when viewed from before expanded and depressed against the front. Humeral angles large and subquadrate, the pronotal sides anteriorly much depressed and nearly straight, a very little expanded behind the eye. Meracanthi long and pointed, reaching just behind the hind coxæ. Last ventral segment of the male narrow and rounded at apex; valve moderately long and expanded at base; uncus lanceolate with the slender point upturned and attaining the apex of the valve. Last ventral segment of the female with a narrow subacute incision reaching nearly to its base. Elytra remarkably broad (9 by 18 mm.); basal areole small, narrow, scarcely angled at apex; costal areole broad (2 by 9½ mm.); marginal very narrow, scarcely wider than the bounding nervures; second ulnar little longer than broad (2½ by 3 mm.), the inner (posterior) side angled close to the apex; apical areoles seven, the first and second as usually found in this genus, being united in one. Wing appendix rounded at apex.

Color black; supra antennal plates, a small dot at the base of the vertex continued as a median line on the pronotum which does not reach the hind margin, narrow hind edge of the pronotum; sides of the mesonotal X posteriorly, elytral nervures except close to their base, depressed sides of the pronotum and legs in part, pale.

Described from one male, without locality, in the collection of the University of California, and two females from Mary's River,

Oregon, received from Dr. Wilson. In this very distinct species the costal nervure is broadly expanded, especially in the male, reaching a width of nearly one millimeter.

8. **Platypedia intermedia** new species.

Size and aspect of *ampliata* but with larger and narrower elytra; supra-antennal plates narrower and more oblique than in *ampliata*, not at all expanded or depressed against the front; humeral angles less produced and more rounded, the sides anteriorly regularly and feebly rounded. Last ventral segment of male short and broad, the apex sinuated; valve longer (4 mm.) and narrower; uncus rather slender, nearly straight below, arcuated above, its apex subacute but not at all unturned. Last ventral segment of female with a deep incision which is much broader posteriorly than in *ampliata*. Elytra 8 by 19 mm., costal nervure broad but of equal width to the apex of the costal areole, this areole about 2½ by 11 mm.; marginal areole much widened apically (about ½ mm.); second ulnar transverse, its inner margin nearly rectilinear, the feeble angle at about one third the distance from the apex; apical areoles eight. Length of insect 18 mm., expanse 23 mm.

Described from numerous examples of both sexes taken in Marin and Sonoma Counties, Calif., in April and May.

9. **Platypedia areolata** Uhler.

Uhler, Proc Acad. Nat. Sci. Phila., XIII, p. 285, 1862 (*Cicada*).

Mr. W. T. Davis has kindly sent me a specimen compared with the type from east of Fort Colville which enables me to locate the name on our larger pale form which seems to be common from the Bay Region of San Francisco northward through Washington. It varies in length from 17 to 20 mm. with an expanse of about 52 mm. The color is more dull and obscure than in *putnami* with very little of the steel-blue tint, the pale markings are more yellowish, rarely tinted with orange. The last ventral segment of the male is narrower and almost triangularly produced at apex; the uncus is a little sinuated, nearly parallel-sided to the apical third, then narrowed to an obtuse tip; costal nervure broad but scarcely expanded; second ulnar areole transverse, the inner margin nearly straight as in *intermedia;* marginal areole a little widened in the male; supra-antennal plates transverse, scarcely oblique.

I have examined a good series of this form taken by Dr. F. E. Blaisdell in Marin and Sonoma Cos. and another series in the col-

lection of the California Academy of Sciences taken by Dr. E. C. Van Dyke in Marin Co. in April and May. Dr. Blaisdell has also taken this species in the Mokelumne Hills, Calaveras Co., Calif. Mr. Davis's specimen is a female from Utah and is larger than any I have seen from the coast.

10. **Platypedia putnami** Uhler.

Uhler, Bul. U. S. Geol. Geog. Surv., III, p. 455, 1877 (*Cicada*).

Under this name I have placed the larger species in which the ground color is more of a blue-black and the pale markings are of a deep or reddish orange. The elytra measure 8–9 by 23–24 mm.; the anterior edge of the pronotum is slenderly pale; the basal half of the first antennal joint is pale as are also the margins of the frontal sulcus, median carina of the clypeus and first joint of the rostrum. Here the sinus of the last ventral segment of the female is broader and this segment in the male is shorter and almost truncated at apex; the uncus is strongly arcuated below and slightly so above, with apex obtuse; the discal nervures of the elytra are piceous nearly to their base; the inner margin of the second ulnar areole is almost rectilinear and there is a distinct pale dot at the middle of the basal margin of the vertex. The eyes also are noticeably more prominent and the front less hairy. Length to tip of the abdomen 21–24 mm. I have before me material from Colorado, Utah, Nevada, Oregon and from Siskiyou and Trinity counties, Calif., the latter taken at Carrville in June by Dr. E. C. Van Dyke.

Normally all our species of *Platypedia* have the following pale markings: sides of the face, supra-antennal plates in part, median line and hind edge of the pronotum, hind margin of the metanotum including the posterior one half of the elevated X, the costal nervure as far as the node and the propleura superiorly.

Genus 5. **CLIDOPHLEPS** new genus.

Allied to *Okanagana* with the same form of head and pronotum, approaching *Platypedia* in its expanded elytra, and well distinguished from both by the greatly thickened and nodose transverse vein at the apex of the clavus. Costal nervure distinctly bent at the node giving the closed elytra a bullate aspect when viewed from above. Elytra

hyaline and when viewed from behind having a purplish iridescence. Marginal areole long, narrow and largely infuscated as in *Okanagana*. First, second and third ulnar areoles elongated and similar in form. Apical areoles eight in number as in *Okanagana* with which genus it agrees in most of its other characters.

Type *Okanagana distanti* Van D.

11. **Clidophleps blaisdelli** Uhler.
Uhler, Trans. Md. Acad. Sci., I, p. 163, 1892 (*Tibicen*).

In the Transactions of the San Diego Society of Natural History, Vol. II, p. 47, 1914, I have given my reasons for identifying this species with our smaller and more slender form. I have taken it only from San Diego Co. and have not seen it in other collections. It is not unlikely that it is a Mexican form with its northern limit of distribution near San Diego.

12. **Clidophleps distanti** Van D.
Van Duzee, Trans. San Diego Soc. Nat. Hist., II, p. 47, 1914 (*Okanagana*).

This is a larger and broader form than *blaisdelli* with a broader costal areole and with the costa more strongly bent at the node. It has the last ventral segment of the male narrower and truncated or feebly emarginate at apex; the pale spots at the anterior points of the mesonotal X are usually pyriform and enclose a black point; the hind margin of the pronotum, a conspicuous median vitta almost interrupted near the hind margin and the very narrow anterior margin are pale, and the lateral areas of the pronotum are obscurely paler. Length of body 25 mm., to tip of elytra 34 mm.

This interesting species is abundant on the chaparral on the higher pueblo lands about La Jolla, San Diego Co. during May and June. It has the habit of shrilling in unison at intervals of from ten to thirty minutes, apparently depending on the strength of the sunshine. They are strong flyers and have a loud rattling note. It is known only from San Diego Co., Calif.

13. **Clidophleps distanti** var. **truncata** Van D.
Van Duzee, Trans. San Diego Soc. Nat. Hist., II., p. 47, 1914 (*Okanagana*).

Differs from the typical form in being smaller (22 mm.) with the elytral nervures paler and the last ventral segment of the male shorter and more truncate at apex. From San Diego Co., Calif.

14. **Clidophleps distanti** var. **pallida** Van D.

Van Duzee, Trans. San Diego Soc. Nat. Hist., II, p. 47, 1914 (*Okanagana*).

Size of *truncata* or a little smaller but with the markings more extended and the last ventral segment more rounded at apex. I found this form along the sea shore at National City at San Diego. It did not seem to have the habit of sounding in unison as do the other forms of this species.

Genus 6. **OKANAGANA** Dist.

Distant, Ann. Mag. Nat. Hist., Ser. 7, XVI, p. 23, 1905.

This genus is distinctively Californian. So far as I know but two species are found east of the Rocky Mountains and most of them seem to be confined to the Pacific Coast States. It may be distinguished from *Tibicina* by its narrower head which is not wider than the mesonotum. The genus is very poor in structural characters so the species are best separated by size and color markings. They are, however, well distinguished by their general facies, habitat and song and in field work there is little danger of confusing them.

15. **Okanagana cruentifera** Uhler.

Uhler, Trans. Md. Acad. Sci., I, p. 161, 1892 (*Tibicen*).

This species was described from Colorado and Nevada. I am doubtfully identifying it with a large black species with bright orange costa which has been taken near San Bernardino. I have seen but three specimens, all females. In this species the head is unusually narrow and pointed (7 by 4 mm.); pronotum 5 by 11 mm. Length 33 mm., expanse 83 mm. Color black, scarcely polished, well clothed with long pale hairs; pronotum immaculate or with the lateral areas obscurely pale; costa, base of wings, legs in part, margins of the apical segments of the tergum, ventral segments and genital pieces bright orange.

16. **Okanagana ornata** new species.

Allied to *rimosa* but a stouter and broader winged form. Black with the costa and commissure on basal one half and the wing veins bright orange. Length 23 mm.; to tip of elytra 36 mm.; elytra 10 by 30 mm. head 3½ by 7 mm., pronotum 4 by 9½ mm., width of mesonotum 8 mm. In this form the first apical areole is unusually long (8 mm.) and is equal to four fifths the

length of the broad costal areole, in *rimosa* this proportion is two thirds. Front strongly compressed, the median sulcus narrow. Last ventral segment of female with a deep, rather broad sinus which is distinctly notched near its fundus; the outer angles of this segment narrower than in any of the allied species. Valve of male long as in *rimosa*.

Color a uniform deep black, scarcely polished, the narrow basal angles and depressed latero-posterior margins of the mesonotum and the apical margin of the last two tergal segments orange. Elytral nervures black, the costal to beyond the node and the commissural to the apex of the clavus bright reddish-orange; hind edge of the ventral segments genital pieces except the oviduct, and the legs bright orange, the last ventral segment red with an oval black mark on either side; lower surface of the anterior femora, about three vittæ on the intermediate and hind femora, a mark on the base of the tibiæ exteriorly and the tips of the tarsi black.

Described from one female taken by Mr. C. L. Fox at Upper Soda Springs, Siskiyou Co., Calif., in July, 1914, and a male from Sonoma Co., received from Mr. Davis. This species may be recognized by its black, almost immaculate upper surface with bright orange venation. The hind edge of pronotum is sometimes very narrowly pale.

17. **Okanagana arctostaphylæ** new species.

Closely allied to *rimosa* but proportionately more slender. Reddish-ferruginous with almost a purplish cast, marked with black on the vertex, anterior margin of the mesonotum and dorsal line of the abdomen. Length 24 mm., to tip of the elytra 33–37 mm.; width of metanotum 9 mm.; width of head 7 mm.; elytra 9 by 28 mm. Head as wide as the anterior portion of the pronotum; front unusually prominent; surface of the head between the impressed areas quite smooth, not wrinkled as in *rimosa*. Front strongly convex, the median sulcus narrow above, transverse rugæ rounding. Pronotum 4 by 10 mm., the sides straight and parallel, or nearly so, anteriorly; humeral angles more produced and subangulate than in *rimosa*, and, with the broad posterior margin, transversely wrinkled. Opercula oblique, their apex feebly rounded and the sides a little sinuated, the meracanthi large. Last ventral segment of the female broadly notched with the sides of the sinus sinuated as in *rimosa*. In the male this segment is unusually long and narrow to the rounded apex. Valve of the male a little shorter than in *rimosa* but longer than in *vanduzeei*. Elytral venation about as in *rimosa*, the basal cell a little narrower. This species is very uniform in its reddish-ferruginous color and is marked with black as follows: vertex excepting the base and sutures, sides of the face, frontal sulcus, rostrum except at base, lateral submargins of the pronotum and a pair of small spots on the middle of its anterior edge, base of the mesonotum (mostly covered by the pronotum), a mark on the sides of the mesonotum and a vitta on its depressed margin, a

dorsal vitta on the tergum, much widened at base, disk of the pleural pieces, at least in part, basal segment of the venter, mostly; sometimes a few small marks on the base of the apical segment, oviduct of the female, a small spot near the apex of the coxæ, femora and tibiæ and a cloud on the subcostal nervure at the node, sometimes absent. Elytra with a distinct purplish tinge.

Described from one female and four male examples taken by Dr. F. E. Blaisdell at Mokelumne Hills, Calaveras Co., at an altitude of 1,800 feet. These were found on the manzanita bushes on the red bark of which they were well concealed by their peculiar reddish coloring which is very remarkable in this genus.

18. **Okanagana rubrovenosa** Davis, ante.

This is a small black species with the head, pronotum and mesonotum clothed with minute dark rufous hairs giving the insect a dull reddish aspect. The wing venation is dark sanguineous becoming orange-red on the base of the hind wings; the costal nervure beyond the node and the commissural blackish. Uncus of male rather narrow and hooked about as in *vanduzeei*. This species recalls *arctostaphylæ* but is much smaller and darker. Mr. Davis has kindly sent me for study his male type from Mariposa Co., California.

19. **Okanagana tristis** new species.

Black, less distinctly polished than in *rimosa;* pronotum proportionately longer and the elytra longer and narrower. Pronotum 4 by 10 mm.; elytra 10½ to 11 mm. by 33 mm. Color deep black, opaque; supra-antennal plates marked with a small pale point; mesonotum with the usual six pale marks small and inconspicuous, and there are also two marks on the lateral angles close to the base of the elytra and one on the middle of the lower lateral margin; in some specimens the hind margin of the metanotum is also narrowly pale on either side; margins of the pectoral pieces and coxæ, lower surface of the femora and tibiæ, edges of the cheeks and front and the median line of the basal segment of the rostrum pale. In the female the sides of the front are concolorous. Venter and genital pieces except the female oviduct, pale, more or less fulvous; the basal segment with a transverse vitta and each segment of the connexivum with a median cloud, black; last ventral segment of the female with an oblique black mark on either side; slender apical margins of the tergal segments beyond the third pale; membrane of the costal nervure inconspicuously brownish grey. Upper surface sparsely covered with deciduous short white hairs with the usual group of longer whitish hairs in the lateral sinuses of the mesonotal X; black surfaces beneath clothed with short silvery pubescense and with longer hairs on the

sides of the face. Length of body 24 to 25 mm.; to tip of the elytra 35 to 37 mm.

Described from one male and two females taken by Dr. F. E. Blaisdell at Shasta Retreat, Siskiyou Co., Calif., at an altitude of 2,416 feet on July 11, 1905, one female taken by Dr. E. C. Van Dyke at Nash Mine, Trinity Co., Calif., at an altitude of 8,000 feet, June 28, 1913, and one female taken in April at Eldridge, Sonoma Co., received from Mr. Davis. The elongated form, somber black color and fulvous venter will distinguish this form.

20. **Okanagana mariposa** Davis, ante.

Closely allied to *rimosa* and *vanduzeei* but larger than either. It has the dull pubescent surface found in *vanduzeei* and the long male valve of *rimosa*. It can be best distinguished from either by its having the male uncus oblong and scarcely narrowed to the truncated apex. The only specimen I have seen was a male type kindly sent me for examination by Mr. W. T. Davis. It was taken in Mariposa Co. in June.

21. **Okanagana rimosa** Say.

Say, Complete Writings, II, p. 372, 1830 (*Cicada*)

This is a deep black, almost a bluish-black, species marked with bright or reddish-orange. In this species the hind margin of the pronotum and usually the lateral and anterior margins more narrowly, are bright fulvous, and there may be a pale line on the middle of the pronotum anteriorly extending a little on to the base of the vertex; the supra-antennal plates are broadly fulvous and the usual six pale marks on the mesonotum are well developed and I have considered them typical in this species (two on the crown of the X, two at the points of its anterior branches and two before these on the apex of the loops). Here the ventral segments are vittate with black, the head is 3½ by 7 mm., measuring on the slope of the head and across the eyes; the pronotum is 3½ by 9 mm.; the width of the mesonotum is 8 mm.; and the elytra measure 8 by 28 mm. Uncus of male without an apical hook. Length of the body 23 to 24 mm.; to the tip of the elytra 33 to 35 mm. This species occurs across the whole continent from Vancouver Island to Quebec and as far south on the west coast as Fresno Co., Calif.

22. **Okanagana canescens** new species.

Proportionately broader and shorter than *rimosa;* head more porrect; color black, less polished than in *rimosa,* the whole surface, especially beneath whitish or greyish pubescent. Head 3½ by 7 mm.; width of mesonotum 8 mm.; length of body 23 mm.; to tip of the elytra 33 mm.; elytra 9 by 26 mm., its first apical areole 7 mm. long, the costal 9 mm.

Pale markings much reduced, soiled yellowish or greenish; pronotum with the hind edge very narrowly pale, the lateral areas scarcely paler; venter pale greenish, the basal one half of the segments black; plural pieces and legs pale or greenish, the femora more or less broadly vittate with black; tibiæ and tarsi black externally. Last ventral segment 2½ times the length of the penultimate, truncate at apex; valve unusually narrow and pointed, five millimeters in length. Last ventral segment of the female with a comparatively small incisure, hardly more than one third the width of the segment and reaching little more than half its length, distinctly sinuated near the fundus.

Described from one male taken by Dr. F. E. Blaisdell at Duncan Mills, Sonoma Co., Calif., July 14, 1908, and a female in the collection of Mr. C. L. Fox without locality but undoubtedly taken in the Bay region. The dull black color and hoary aspect of this species will readily distinguish it.

23. **Okanagana vanduzeei** Dist.

Distant, Ann. Mag. Nat. Hist., Ser. 8, XIV, p. 165, 1914.

This species differs from *rimosa* in averaging a little smaller, in having the pale marks less extended and especially in having the last ventral segment of the male shorter and broader and truncated or somewhat emarginate at apex and the male valve obviously shorter, extending but about 3 mm. beyond the apex of the last ventral segment and the uncus is distinctly hooked at apex. The surface is more greyish from the presence of short deciduous scale-like hairs and has less of the polished blue-black tint seen in *rimosa.* The face also is more heavily clothed with long whitish hairs.

The type locality for this species is San Diego Co., Calif., but Dr. Van Dyke has taken it from as far north as Mt. Rainier, Wash., where he found it at an altitude of 6,000 feet. It seems to be the most generally distributed of our west coast Cicadas.

24. **Okanagana vanduzeei** var. **consobrina** Dist.

Distant, Ann. Mag. Nat. Hist., Ser. 8, XIV, p. 165, 1914.

This form differs from typical *vanduzeei* in being a little larger and apparently if not actually a little broader, and in being more hairy, with the surface more closely clothed with appressed yellowish deciduous scale-like hairs. It also has the pale colors much more extended with the elytral nervures pale on their basal one half. The male uncus scarcely differs from that of *vanduzeei*. Its more hairy surface, paler colors and more compact oval form gives this species a much more distinct appearance than its structural characters will justify.

25. **Okanagana noveboracensis** Emm.

Emmons, Nat. Hist. N. Y., Agric., V, 152, pl. 9, fig. 6, 1852 (*Cicada*).

This is the only *Okanagana* I know that is peculiar to the east. It is included here to complete the record of our known forms of this genus. It is a little longer than *rimosa* with an obviously narrower head (1½ by 6 mm.), and has the pale markings much more extended and more tinged with greenish rather than with orange, the lateral areas of the pronotum being mostly pale. The male uncus is a little longer and more parallel than in *rimosa* and is without a hook at apex. I have seen specimens of this only from the vicinity of Niagara Falls.

26. **Okanagana vandykei** new species.

Allied to *rimosa* with the pale markings much extended and scarcely tinged with orange, sometimes distinctly greenish. Head 3½ mm. by 7 mm.; pronotum 4 by 10 mm.; length 25 to 27 mm. to tip of elytra 33 to 37 mm.; expanse 70 mm. Front rather strongly compressed, the median carinæ unusually prominent and the sulcus well expanded below the middle.

Color black, less polished than in *rimosa*. Vertex black with a pale basal mark behind each lateral ocellus; supra-antennal plates and superior base of the front conjointly pale; a black cloud on the prominent apex sometimes extending to the basal suture. Pronotum pale with a median black vitta geminate anteriorly, and some black marks in the lateral depressions. Mesonotum with a lateral vitta, the edge of the expanded lower margin, the disk of the X and a large spot at the tip of its anterior branches including the apex of the loop, pale. Hind edge of the metanotum and basal segment of the abdomen slenderly pale. Tergum and superior genital pieces black, the sides of the apical segment marked with pale. Beneath and legs mostly pale,

the sides of the face, disk of the meso- and metapleura, base of the first ventral segment, a line on either side close to the base of the remaining segments, a cloud on each segment of the connexivum and a mark either side of last ventral segment and the oviduct of the female black. Front more or less ferruginous. Knees and apex of the tarsi above touched with black. Elytral nervures pale to beyond the node, infuscated at apex. The hyaline portion of the elytra slightly fuliginous, the basal areole subopaque, fuscous. Male uncus much like that of *noveboracensis* but a little broader and more convex below toward the apex.

Described from four examples taken by Dr. E. C. Van Dyke; one pair captured at Carrville, Trinity Co., Calif., June 29, 1913, two males from Nash Mine, Trinity Co., June 29, 1913, at an altitude of 8,000 feet, and one male taken by Mr. Nunenmacher in Plumas Co. in June and now in the collection of Mr. Davis.

It affords me pleasure to name this distinct species for its discoverer who has long been known as one of the most active and efficient entomologists on the coast, a close student of the Coleoptera and perhaps our best authority on the ecology and distribution of the west American insect fauna.

27. **Okanagana californicus** Dist.

Distant, Ann. Mag. Nat. Hist., Ser., 8, XIV, page 166, 1914.

This pretty species resembles *consobrina* but it is smaller with the surface more polished, the colors clearer, the pale markings more extended and the surface less densely clothed with pale scale-like hairs. The male genital characters scarcely differ from those of *vanduzeei* of which it may be but a variety. Thus far it has been taken only south of the Tehachapi.

28. **Okanagana striatipes** Hald.

Haldemann, Stansbury's Expedition, p. 369, pl. 9, fig. 2, 1852 (*Cicada*).

As I determine this species it is very close to *californicus* but is more strongly narrowed anteriorly, the head is narrower (3 by 5 mm.), the front is more produced above and mostly black, the pronotum is black margined all around with pale and sometimes with pale marks in the lateral depressed lines, the venter is pale and immaculate, the mesonotum wants the pale marks at the apex of the loop and sometimes those at the anterior angles of the X. The male

genital characters of these species scarcely differ. Dr. J. C. Bradley took this species in Humboldt Co., Calif., in June, the California Academy of Sciences has an example taken by U. C. Stevens in Coos Co., Oregon, in June, and Dr. Wilson sends me specimens from Oregon taken at Marysville and Corvallis in June and July. It was described from Utah.

29. **Okanagana triangulata** Davis, ante.

This is our largest species of the *synodica* group. It has prominent rounded supra-antennal plates; the basal areole of the elytra is decidedly narrowed to an obliquely rounded apex; the pale hind margin of the pronotum is rather broad, the disk of the mesonotum is black with the four pale spots small. The abdomen is pale with a large triangular black basal spot on the tergum reaching the sides at base and attaining the anteapical segment and there is a row of black marks along each side. The last ventral segment is rather narrow at apex and almost truncated; valve long; uncus oblong, parallel sided, its apex slightly curved above with an arcuated notch beneath.

Mr. Davis has kindly sent me for examination a male type taken by Mr. Nunenmacher in Mendocino Co. in May.

30. **Okanagana mercedita** Davis, ante.

This is a smaller species than the preceding with which it agrees in having rounded supra-antennal plates. The basal areole of the elytra is oblong and square at apex. The colors are clearer than in the preceding species with the pale areas inclined to fulvous in places and more extended. The abdomen is black above with the hind edge of the segments very narrowly paler; the venter is pale with the discal base of the segments blackish and there is a black spot on either side of the last ventral segment of the female; the hind margin of this segment is deeply narrowly excavated almost to its base.

I have seen but a single female specimen, taken in Merced Co., Calif., in June and sent to me for examination by Mr. Davis.

31. **Okanagana synodica** Say.

Say, Complete Writings, II, p. 253, 1825 (*Cicada*).

Form ovate and quite strongly narrowed before. Front prominent, roundedly angulate when viewed from the side; striæ con-

spicuous, continued well over on to the superior base but omitting a triangular basal area; median sulcus well defined and continued to the apex. Supra-antennal plates oblique when viewed from above; the carinate edge sharp, curved about the antennæ and produced well down on the side next the eyes. Pronotum 3 by 7 mm.; both anterior and posterior margins rather strongly arcuated, the former broadly flattened, without a linear smooth marginal carina; sides distinctly emarginate before the prominent rounded humeral angles; anterior to the sinus nearly straight and crenulated. Mesonotal X more transverse. Meracanthi rather broad, about equalling the opercula. Basal areole of elytra oblong, parallel, a little oblique at apex, its inner margin rectilinear. Last ventral segment of male broadly rounded; valve long, about 4 mm. (Uncus concealed in the specimen before me.)

Color black above, pale beneath. Median vitta and margins of the front, supra-antennal plates and median line of vertex and basal margins and lateral areas of pronotum pale, the latter interrupted by a black vitta at the humeri; the median line of pronotum mostly pale. Mesonotum with the lateral margins, the X, and two discal vittæ covering the loops and anterior arms of the X, pale; the transverse scrobe of the X brown. Narrow edges of the tergal segments and their broad sides pale, the apical segments mostly pale. Beneath the coxæ, femora, tarsi and basal segment of the venter are marked with black. Elytral nervures pale to the apical areoles; basal areole opaque, chestnut brown. Length to tip of abdomen 18 mm., to apex of the elytra 22 mm.

Redescribed from one male taken at Denver, Colo., by Mr. Oslar and received from Mr. Davis who writes me that this determination is in accordance with that in the Uhler collection, and it is as correct as can probably now be made. This species may not occur in California but the description is included here for comparison with our closely related forms. The male uncus is concealed in this specimen.

32. **Okanagana uncinata** new species.

Allied to *triangulata*, a little smaller with the supra-antennal plates oblique and the male uncus with a short broad hook at apex.

Front prominent as in *synodica*, the striæ nearly obsolete over the apex; superior basal area rounded before; median sulcus nearly obsolete above and

below but with prominent carinæ at the middle; viewed from the side the front is rather strongly angled at the middle; supra-antennal plates oblique, their carinate edge distinct across the whole width but not carried down below the line of the antennæ next the eye. Pronotum 3 by 8 mm.; anterior and posterior margins regularly feebly arcuated, the femora narrowly calloused as in the allied species; prominent humeral angles subquadrate, the sides anteriorly regularly feebly arcuated. Mesonotal X less transverse than in *triangulata* or *synodica*. Merecanthi narrower and shorter than in *triangulata*, not quite as long as the opercula. Basal areole of the elytra oblong, parallel, the inner margin rectilinear and the apex cut off square. Last ventral segment of the male rather short and truncated at apex; valve long, 3½ mm.; uncus with a broad truncated hook at apex.

Color fuscous or blackish; pale markings much extended; margins of the front and tumid apex of the head paler; vertex with three obscure paler basal spots. Pronotum with the median and lateral impressed lines pale; the pale margins much extended on the sides and humeri; narrow calloused anterior edge conspicuously pale; mesonotal X and loops mostly or entirely pale as are also the narrow margins of the abdominal segments; the connexivum broadly pale and marked with transverse black spots above. Valve pale, the genital pieces piceous; pleural pieces and legs mostly pale; elytral venation black toward the apex, the basal and base of the adjoining areoles opaque and brown. Length to tip of abdomen 18 mm., to tip of elytra 22 mm.

Described from two males taken by me on grass along the road five miles north of San Juan Capistrano, Calif., June 25, 1914.

33. **Okanagana minuta** Davis, ante.

This is the smallest *Okanagana* known to me. The front is unusually prominent and rounded before when viewed from the side, with the superior basal area broad-triangular and the sulcus conspicuous above but nearly obsolete below. Supra-antennal plates oblique with their carinate edge straight above when viewed from before becoming obsolete on the sides next the eyes. Pronotum broadly feebly arcuated before, more strongly so behind, the anterior slenderly carinate; sides obtusely emarginate before the rounded humeri. Basal areole of the elytra parallel, its apex slightly oblique. The last ventral segment of the male is narrower than usual and rounded at apex; uncus elongate-ovate, narrowed to the apex which is armed with rather long and narrow vertical hooks. The pale colors in this species are but little extended with the narrow margins of the abdominal segments and the genital pieces pale.

Of this species I have seen a series of 13 males kindly sent me for

study by Mr. C. H. Kennedy from the Stanford University collection. I also possess two very small males taken in Fresno Co., by Dr. J. C. Bradley in June, 1907, which seem to differ only in having the last ventral segment broader and sinuated at apex. I could find no difference in the form of the uncus or in other structural details.

Genus 7. **TIBICINOIDES** Dist.

Distant, Ann. Mag. Nat. Hist., Ser. 8, XIV, p. 166, 1914.

Peculiar in having the basal one half of the elytra infuscated and subcoriaceous and the transverse fold crossing the elytra at the node strongly developed, resembling a transverse nervure.

Type *Tibicen cupreo-sparsa* Uhler.

34. **Tibicinoides cupreo-sparsus** Uhler.

Uhler, Trans. Md. Acad. Sci., I, p. 43, 1889 (*Tibicen*).

This pretty little species is very distinct by its elliptical form, blackish-brown color and the scarlet base of the wings. It has been found in San Diego Co., and as far north as Los Angeles. It occurs close to the ground on a low fine grass and makes a feeble chirping sound that can be heard but a short distance and is easy to locate.

35. **Tibicinoides hesperius** Uhler.

Uhler, Bul. U. S. Geol. Geog. Surv., I, p. 342, 1876 (*Cicada*).

This larger species was described from Colorado but Dr. Uhler reports it from Nevada and from the vicinity of San Francisco and San Diego. I have not seen specimens from California.

Note.—After this paper had gone to the printer Mr. Davis kindly sent to me for examination examples of the following two species previously unknown to me. As indicated by the numbers *Okanagana hirsuta* should follow *mariposa* and *occidentalis* should follow *canescens*.

20a. **Okanagana hirsuta** Davis, ante.

A large species with the elytra broader than in *rimosa* that may at once be distinguished from all the allied forms by its having the lower surface and legs rather thickly clothed with long grey hairs. The basal areole of the elytra is entirely hyaline with its apical angle

a little more than a right angle; the pronotum is black with its hind edge narrowly pale; the mesonotum has the six discal fulvous spots smaller than in *rimosa;* and the tergal segments are very slenderly edged with fulvous on either side, more broadly so on the second segment.

Mr. Davis has kindly sent me for inspection a female type taken on Santa Rosa Island off the coast of Santa Barbara Co., Calif.

23a. **Okanagana occidentalis** Walk.

Walker, in Lord, Nat in Vanc. Isd. and Br. Columbia, ii, p. 339, 1866, *Cicada.*

Walker's description of this species applies almost equally well to *rimosa* but he distinctly mentions the fact that the first transverse vein is parted from the second by more than twice its length. The present species is the only one known to me of which this is true. It differs however from Walker's description in having the elytral nervures black to their base and in wanting the pale markings on the disk of the pronotum. This species differs from all its allies in having the first ulnar nervure forked very near its base; the wing appendix is also broader with its anal areole broader and more rounded at apex.

Of this form I have seen but a single female specimen which was kindly sent me for study by Mr. W. T. Davis. This individual was taken at Dilley, Oregon, in July.

A NEW MEMBRACID FROM NEW YORK (HOMOP.)

BY LEWIS B. WOODRUFF,

NEW YORK, N. Y.

Just north of the limits of New York City a species of *Cyrtolobus* flourishes which seems to be as yet undescribed. It falls in the subgenus *Atymna,* Stål. Although occurring in great abundance on its food plant, *Quercus bicolor,* in the locality where it has been found, the trees show no apparent injury from its presence. Both sexes

have been taken, the females outnumbering the males more than two to one. The species is characterized as follows:

Cyrtologus helena, new species. Plate IV, Figs. 1 to 5.

Slender. Pronotum low, coarsely and unevenly punctate, densely on metopidium, progressively more sparsely from humeri to apex; highest at point over posterior end of humeral sinus, thence arcuate to apex.

Face very uneven, sparsely and finely punctured, margins of the cheeks sinuate. Clypeus gradually produced and incurved at apex. Tibiæ with fine spines.

Male type.—Characterized generally as above, the dorsal crest gently arcuate from before humeral angles to medial transverse vitta, thence rather abruptly decurved and almost rectilinear to apex, which reaches a point above anterior angle of costal cell of elytra next forward of terminal areole. Face and base of metopidium yellowish green, eyes clouded. Pronotum with anterior vittæ light warm brown narrowing unevenly from just above medial lateral margins to carina, where they meet in an acute angle anterior to point above humeri. Medial and apical vittæ reaching lateral margins, black for dorsal third, dark brown below, the former vitta throwing a process forward toward anterior vitta two-thirds below dorsal carina. Between these vittæ, and forward of the anterior V, the ground color of the pronotum is creamy white, including the upper part of the metopidium. Elytra clear hyaline, at extreme base narrowly thickened, punctured, and clouded with dark brown; apical cloud sharply defined, blackish brown, almost covering terminal areole and abruptly narrowing to meet pronotal apex. Nervures brown on apical half, creamy toward base. Beneath and legs creamy white; claws pinkish, tipped with black. Abdomen black, last joints medially and claspers pale. Length 6 mm.

Female allotype.—In form and structure like the male, but slightly larger, and the dorsal crest is distinctly higher and more regularly arcuate to the tip, which reaches middle of terminal areole. Face and pronotum pale green, the latter irregularly peppered with whitish. Carina broadly creamy white with central interrupted narrow black line from basal third almost to apex, the black irregularly staining the white beneath it. Broad pinkish spots at anterior margin of metopidium. Beneath pale green, base of abdomen, ovipositor, and claws pinkish, the latter black at apices. Elytra wholly hyaline. Length 7 mm.

Male type and female allotype taken by author *in coitu* on *Quercus bicolor* at Bronxville, Westchester County, New York, June 8, 1913. Type and allotype in author's collection; paratypes in collections of E. P. Van Duzee, W. T. Davis, University of California, Cornell University and American Museum of Natural History.

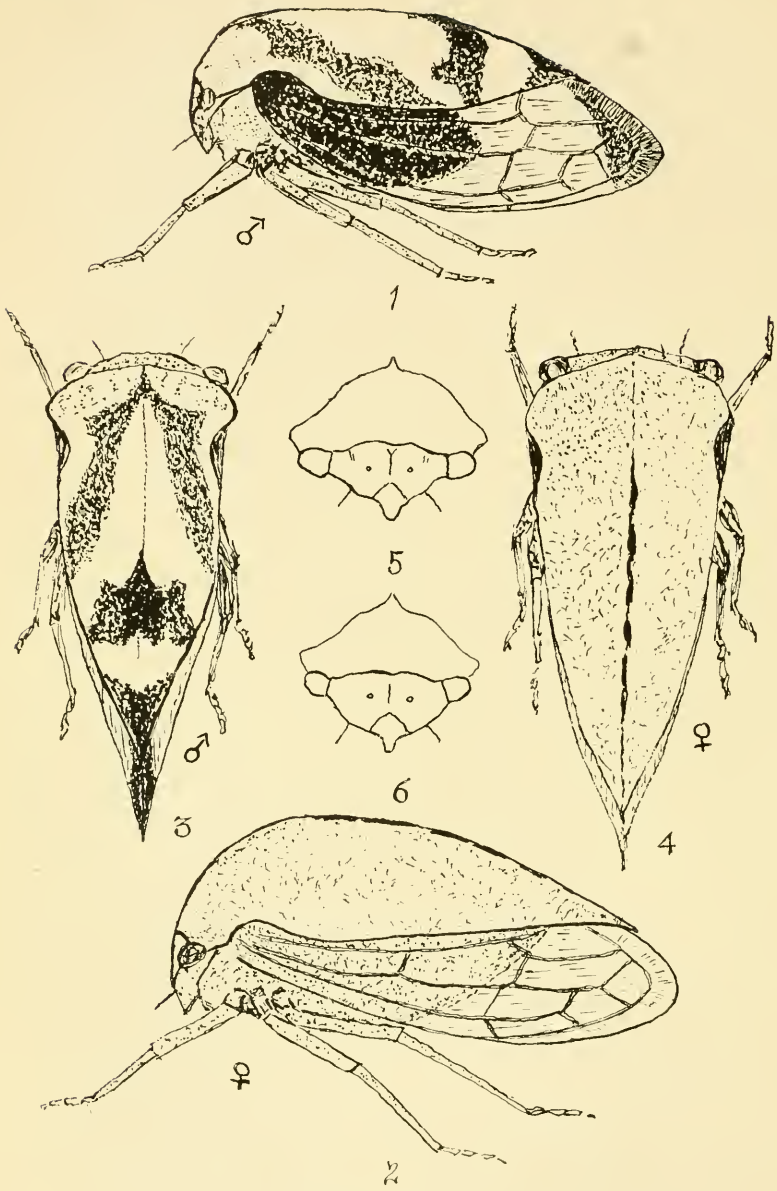
A large series of topotypic examples, including several copulating pairs taken in the years 1911 to 1914 inclusive, shows in the male considerable variation in the width and extent of the pronotal dark vittæ, which are sometimes maculated with creamy white, and occasionally a dark spot is found on the pronotal carina in the middle of the pale area bounded by the anterior oblique and the medial transverse vittæ. The greenish color of the base of the metopidium also varies in extent, often wholly suffusing it, while the black of the abdomen, and, in general, the amount of pigmentation throughout, is dependent upon the degree of maturity of the insect. In the female the amount of the whitish pronotal maculation is very variable, as is the continuity of the black line along the dorsal carina. The abdomen, too, is often wholly whitish green. The accompanying plate illustrates the maculation and form of the specimens described, except that they are somewhat more slender than is indicated in figures 3 and 4.

Falling close to *Cyrtolobus* (*Atymna*) *querci*, Fitch, it is readily distinguished from that species in the male by the creamy white pronotal area, pale metopidium and clear hyaline elytra with sharply defined apical fuscous cloud. The female is very similar in aspect to the female of *querci*, but in general the green of the crest is more mottled with whitish, and the black line on the dorsal carina more interrupted. In form the crest in both sexes is more decidedly arcuate, is continued higher posteriorly, and is more coarsely and less densely punctured; the anterior marginal ridge of the cheeks is more sinuate; and the clypeus more broadly and gradually produced.

This species appears in the mature form about the first of June and reaches its greatest abundance at the middle of the month, continuing, however, through July. Although *Quercus alba* (on which *Cyrtolobus querci* abounds) and oaks of the *Q. rubra* series occur in the immediate neighborhood, I have never found this species on any of them, *Q. bicolor* apparently being its exclusive food plant.

Mr. E. P. Van Duzee, to whom I have submitted examples, has kindly examined the species and compared it with the material in his own very complete collection, and writes me that it is new to him, confirming my conclusion that it is as yet undescribed.

The species is named in honor of my wife in recognition of her self-sacrificing encouragement of my entomological studies.



Membracidæ.

EXPLANATION OF PLATE IV.

Fig. 1. *Cyrtolobus helena,* lateral view of male.
Fig. 2. *Cyrtolobus helena,* lateral view of female.
Fig. 3. *Cyrtolobus helena,* dorsal view of male.
Fig. 4. *Cyrtolobus helena,* dorsal view of female.
Fig. 5. *Cyrtolobus helena,* outline of anterior aspect.
Fig. 6. *Cyrtolobus querci,* outline of anterior aspect.

NEW COLEOPTERA AND MISCELLANEOUS NOTES.

BY CHARLES SCHAEFFER,

BROOKLYN, N. Y.

Trechus borealis new species.

Elongate, piceous, shining, antennæ, palpi and legs paler. Frontal impressions deep; eyes moderately prominent. Prothorax transverse, anterior margin feebly emarginate, basal margin straight at middle, more or less oblique on each side; lateral margin moderately arcuate in front, convergent behind; basal angles reflexed, obtuse not acute; median line deeply impressed. Elytra elongate-oval, generally with five more or less distinctly impressed, punctured striæ. Length 4 mm.

Labrador, Battle Harbor (Engelhardt); Newfoundland, Bay St. George (Engelhardt); New Jersey; Lg. Island, Bellport (Nicolay).

This is the species I incorrectly identified and described in my synopsis[1] as *Trechus rubens.* The latter is a European species and I doubt its occurrence in North America, at least, it differs from any North American species which I have seen. Herr Edmund Reitter of Paskau, Böhmen, very kindly sent me a few specimens of the true *T. rubens* which resemble the below described *T. chalybæus* var. *coloradensis* very much but have longer antennal joints, less prominent eyes, longer elytra with five impressed, punctured elytral striæ, the prothorax less transverse and relatively longer with lateral margins more widely reflexed and the hind angles rectangular and acute.

The above described *T. borealis* has some of the characters of *T. rubens,* but the prothorax is relatively shorter with the hind angles

[1] Bull. Am. Mus. Nat. History, Vol. XIV, p. 210, pl. XXVIII, fig. 1.

obtuse, not acute and the antennal joints and the elytra are relatively shorter than in *rubens*.

T. chalybœus, of which I have specimens from Alaska, British Columbia, California and Whiteface Mt., New York, differs from *T. borealis* in having slightly larger and more convex eyes, the hind angles of prothorax acute and nearly rectangular, the base of thorax straight, not oblique each side, and generally only the first three elytral striæ impressed. It is also reported from New Jersey but I doubt the correctness of the determinaion as my New Jersey specimen is *T. borealis*.

The specimens of *T. chalybœus* in my collection from the above mentioned localities show *inter se* very little variation, however, there are two forms, one from Utah and one from Colorado, which differ sufficiently to receive a name as varieties of *T. chalybœus*.

Trechus chalybæus var. **utahensis** new variety.

This form, collected by J. Chr. Weidt in southwest Utah, is larger (15.5 mm.) and a little more convex than *chalybœus* but has the elytral striæ as in *rubens* and *borealis,* that is, five distinctly impressed striæ with the sixth and seventh feebly impressed, but the latter more prominent than in typical *chalybœus*. The form of thorax and the prominent eyes as in *chalybœus*.

Trechus chalybæus var. **coloradensis** new variety.

This form, from Colorado, has the thorax almost as in typical *rubens,* that is, relatively longer and the lateral margin behind middle somewhat sinuately narrowing to the basal angles, which are acute and a little prominent, the elytra and eyes as in typical *chalybœus*.

Trechus barbaræ Horn.

Dr. Horn in his description of this species states that the dorsal punctures of elytra are as usual. Having only a single specimen at the time I wrote the synopsis, I suggested that the five or six setigerous punctures on each elytron of the specimen kindly loaned me by the late Charles Fuchs and figured on plate 28, Vol. XIV of Bull. Am. Mus. Nat. Hist., are possibly abnormal. However, a second specimen, which I have seen lately, has also on each elytron an irregular row of five or six setigerous punctures.

Philonthus chalceus Steph.

Several specimens collected by Mr. E. Shoemaker on Long Island, N. Y., and one at Alexandria Co., Va., are referable to *P. chalceus* Steph., a European species.

This species is of the size of *P. politus* Linn. (*æneus* Ross.) but is of a greenish bronze color; the head is more oval with the hind angles more rounded and more sparsely punctured. The prothorax has a dorsal series of three punctures. The basal line of the first two dorsal segments is produced at middle as in *æneus* but not as strongly. The anterior tarsi of the male are only feebly dilated and the last ventral segment is at middle very deeply triangularly emarginate, the penultimate feebly so at middle.

Philonthus varians Payk.

In his Synopsis of the Philonthi of Boreal America in Trans. Am. Ent. Soc., XI, 195, Dr. Horn, remarking under *Philonthus varians,* "the form occurring with us is the variety *agilis,*" gives only a description of this variety. However, typical *varians* occur also in the United States and are frequently taken by local collectors at the following localities: New Lots, Long Island, N. Y., by E. Shoemaker; Bellport, Long Island, N. Y., by A. Nicolay; Fort Montgomery, N. Y. and Franklin Furnace, N. J., by F. M. Schott.

Typical *P. varians* are black with feeble metallic lustre, elytra with a red or reddish yellow spot. The reddish spot variable in size and more or less triangular, widest near apex and narrowing towards the basal angles, sometimes reduced to a small subtriangular subapical spot, rarely specimens occur without spot.

The variety *agilis* differs from the typical form in being smaller, antennæ a little shorter and stouter with the joints more transverse; the color is black with feeble metallic lustre, the elytra are black or piceous, at apex reddish brown or sometimes entirely reddish brown.

Saurohypnus scutellaris Sharp.

This species, of which I have a specimen from Brownsville, Texas, has to be added to our list. It was described from Mexico and the genus and species was mentioned by Col. Casey in his paper on the Xantholini[1] as not occurring in our fauna.

[1] Trans. Acad. Sci. St. Louis, Vol. XVI, pp. 366–375.

Canthon nigricornis var. **punctaticollis** new variety.

Form, size and characters of *nigricornis*, but prothorax and head finely scabrous and with numerous punctures.

Florida.

The prothorax in *nigricornis* is granulate, the granules elongate, of which there is no indication in *punctaticollis*.

Canthon puncticollis Lec.

Canthon nyctelius Bates, Biol. Cent. Am., Col., Vol. II, pt. 2, p. 31.

C. nyctelius described by Bates from Mexico was compared by him with *C. puncticollis* Lec., from which he distinguished it "by the remarkable depression at the base of the thorax and elytra, and the corresponding elevation of the second and third elytral interstices at their base." Though Dr. Leconte does not mention these characters in the description of *C. puncticollis* the type and all other Lower California specimens, which I have seen, have this thoracic and elytral depression very well pronounced. Arizona specimens and those which I have taken in Hidalgo and Brownsville, Texas, differ constantly from typical *puncticollis* in the absence of this thoracic depression and are therefore entitled to a separate name.

Canthon puncticollis var. **integricollis** new variety.

Differs from typical *puncticollis* in the absence of the distinct, subtriangular basal depression at middle of the prothorax. The scutellar depression is variable, well pronounced in some specimens in others less and the tumid elevation of the second and third elytral interval at base may be more or less distinct or entirely absent. The size is generally smaller and the elytral and thoracic sculpture finer. Length 5 mm.

Hidalgo (type) and Brownsville, Texas; Sta. Rita Mts., Arizona.

Aphodius hæmorrhoidalis Linn.

Several specimens, which I identify without hesitation as this European species, were taken by Mr. Fred. Wintersteiner at Secaucus and Hackensack meadows in New Jersey.

This species is a little shorter and stouter than *granarius*, black with apex of elytra reddish brown (typical form); sometimes the humeral unborne also reddish (var. *humeralis*); the prothorax is coarsely punctate with some finer punctures intermixed. The scutellum is long, not longitudinally impressed and densely punctured except at apex; the elytral striæ are more deeply impressed and wider than

in *granarius*, the intervals are flat and finely punctate; the hind tibiæ are fimbriate with equal spinules.

By its elongate scutellum *hæmorhoidalis* has to be associated in our fauna with *fossor, hamatus* and *erraticus*.

Strategus julianus var. **arizonicus** new variety.

Two fully developed male specimens from Prescott, Arizona, in my collection differ from specimens from Texas by having the lateral prothoracic horns acute or subacute and not broad and more or less obliquely truncate at apex as in typical *julianus;* the median ridge of prothorax is flatter and the lateral impressions are not as deep as in typical *julianus* and feebly or not at all rugose; the clypeus is acutely triangularly emarginate. The female does not differ from typical *julianus*.

In about twenty-five males from Texas, from small males with feebly developed cephalic and prothoracic armature to large, fully developed males the lateral thoracic horns are broad at apex and not pointed and agree with Burmeister's description, "*cornibus pronoti maris posticis latis, alæformibus.*" *Strategus julianus* was originally described from Mexico.

Heterobrenthus texanus new species.

Male.—Narrow elongate. Head quadrate, constricted behind, vertex, convex, sulcate, at base slightly emarginate with the angles somewhat depressed and projecting. Beak as long as the prothorax, more or less distinctly sulcate, between the eyes and the antennal insertion broader than before the latter, apex dilated. Antennæ inserted at about the middle of the beak, reaching a little beyond the middle of the prothorax, joints two to eleven gradually increasing in length and width, the first seven antennal joints glabrous, the last four pubescent. Prothorax elongate, apex and base truncate, at base constricted, sides arcuate, narrowing to apex; surface smooth, shining, with a few very small punctures. Elytra at base as wide as the prothorax in its widest part, feebly narrowing to apex, which is slightly sinuate truncate, surface shining, the two striæ near suture deeply impressed and impunctate, the outer ones represented by rows of more or less distinct and rather coarse punctures, the intervals at apex more or less costiform; color piceous, a spot at base on

H. texanus n. sp.
Male.

the third and fourth interval and on each of the third, fourth and seventh intervals a little before middle and on the third, fourth and fifth about apical third reddish yellow. Head beneath with four or five large punctures on each side. Body beneath smooth and shining. Anterior femora with a tooth, front tibiæ arcuate and with a rather strong tooth below middle; intermediate and posterior femora and tibiæ mutic.

Female.—Differs from the male in having the beak longer and narrower before the antennal insertion, and not dilated at apex and the tooth on anterior femora much smaller, anterior tibiæ feebly curved, otherwise as the male. Length 8–10.25 mm.

Texas, one male (O. Dietz); Los Borregos near Brownsville, Texas, one female in the National Museum (H. S. Barber).

This species looks very much like a small *Eupsalis minuta* in form and coloration, but has a different form of head and antennæ and longer beak. It is very close to the Mexican *H. distans* from which it seems to differ only in the markings of elytra.

The male in my collection, collected by the late Ottomar Dietz, was only labelled "Texas" but as he also collected in Brownsville and received afterwards some material from there I think that the specimen came from Brownsville, as I greatly doubt the occurrence of this species outside of semitropical Texas.

Since Dr. Horn's revision of the Brenthidæ[1] two species representing two genera new to our fauna have been added and to facilitate the recognition of these and the one described above a table for the identification of genera and species known to occur in North America is given below.

In Genera Insectorum and Coleopterorum Catalogus the genus *Cylas* is not included in the family Brenthidæ. The genus is a disturbing element and is perhaps better placed in a separate family.

TABLE OF GENERA AND SPECIES OF NORTH AMERICAN BRENTHIDÆ.

1. Head longer than broad, oval, prolonged and convergent behind the eyes, beak of female shorter than that of the male 6
   Head short, transverse or quadrate, hardly prolonged and not convergent behind the eyes, beak of female either equal in length to that of the male or longer 2
2. Antennal joints two to eleven equal in width, or the outer slightly narrower; head simple without any projecting hind angles, not strongly constricted behind, vertex not, or at most faintly sulcate; beak very dis-

[1] Trans. Am. Ent. Soc., Vol. IV, p. 127.

similar in the two sexes; shorter and broader in the male, very narrow, cylindrical in the female. Eastern N. America.

Eupsalis Lac.

Antennæ with outer four or five joints ovate or subovate, last joint strongly acuminate.

Thorax very sparsely and finely punctate, beak of male of the larger specimens very short and broad with prominent stout mandibles ..... *E. minuta* Oliv.

Thorax distinctly punctate, beak of large males elongate and narrower ..... var. *lecontei* Pow.

Antennæ with outer five joints cylindrical or sub-cylindrical, last joint long; beak of male elongate narrow; thorax very sparsely and finely punctate ..... subsp. *Sallei* Pow.

Outer joints of antennæ broader 3

3. Joints two to eleven gradually increasing in length and width 5

Joints two to eight of antennæ equal in width or very nearly so, last three joints slightly broader, forming a feeble club 4

4. Suture between first and second ventral segments distinct and deeply impressed ..... *Vasseletia* Sharp.

Brown, opaque; rostrum of male in front of antennal insertion moderately broad and slightly dilated at apex, of female narrow and cylindrical; head and posterior part of rostrum impressed above; prothorax constricted in front, surface with longitudinal broad, median impression; elytral intervals alternately convex and not punctate, the other intervals with large somewhat perforate punctures. (Lower California) ..... *V. vasseleti* Boh.

Suture between first and second ventral segments obliterated at middle, visible at sides ..... *Trachelizus* Schönh.

Brown, more or less shining, rostrum nearly alike in the two sexes, except that the basal part is as long as the apical in the male and of equal width, while the female has the basal part shorter and broader than the apical; prothorax nearly impunctate with a strong, longitudinal median impression; elytra nearly parallel with strongly impressed sutural striæ which are impunctate, the other striæ represented by rows of feebly impressed punctures, except the three near side margin, which are deeply impressed. Femora and tibiæ mutic. (Key Largo and Elliott's Key, Florida.) ..... *T. uncimanus* Boh.

5. Head strongly constricted behind, vertex sulcate with basal angles slightly projecting backwards, behind each eye an angular projection.

Heterobrenthus Sharp.

Color piceous or castaneous; prothorax elongate, oval, convex, not longitudinally impressed; elytra with flavous spots nearly as in *Eupsalis minuta* and varieties. Rostrum nearly alike in both sexes, but of the male slightly broader in front of the antennal insertion

and dilated at apex, of the female slender and not dilated at apex; anterior femora and tibiæ dentate, intermediate and posterior femora mutic (Brownsville, Texas.).....*H. texanus* n. sp.

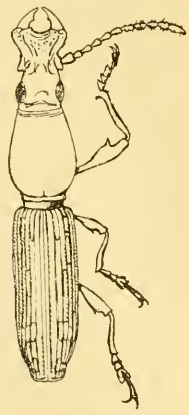
6. Antennal joints gradually increasing in width; beak slender, shorter in the female than in the male.....*Brenthus* Fab.

Second elytral interval narrow, costiform from a little before the middle to apex; thorax elongate conical in both sexes, longitudinally impressed from base to nearly to apex, all the femora dentate in both sexes (Lower California).....*B. peninsularis* Horn.

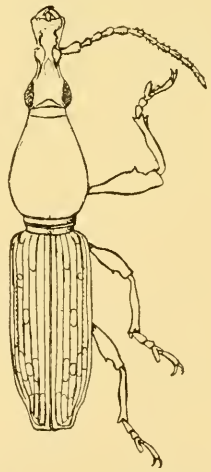
Second elytral interval flat in its entire length, thorax very elongate and broadly constricted at middle in the male, conical in the female, longitudinally impressed in basal half, only the anterior femora dentate (Southern Florida and Lower California).

B. anchorago Linn.

Power in Ann. Soc. Ent. de France, 1878, Vol. VIII, p. 494, described *Eupsalis lecontei* and *sallei* from North America which never have been recognized in the United States. Of *lecontei* I have four large males (21 mm.) from New York, Wisconsin and northern Illinois and of *sallei* four males and two females of different sizes (11–19 mm.) from Virginia, Florida and Texas. Both differ from large developed males of typical *minuta* in having a narrower and more elongate beak and smaller head, the prothorax is very finely



Eupsalis minuta Oliv.
Male.



E. minuta ssp. sallei Pow.
Male.

obsoletely punctate in *sallei*, distinctly punctate in *lecontei*, the antennæ of *lecontei* are as in *minuta*, that is, the outer joints are ovate or subovate, in *sallei* cylindrical or subcylindrical.

The females of *lecontei*, which I do not know, very likely differ only from typical *minuta* in the stronger punctate prothorax and those of *sallei* in the cylindrical outer joints of antennæ, otherwise they are exactly like *minuta*.

In a large number of specimens, collected mostly in the neighborhood of New York City, the beak of the males varies according to the development of the specimen, but as a rule the larger fully developed males have the beak very short and very broad at apex with large, prominent mandibles while in the smaller and feebler males the rostrum is relatively a little longer, narrower at apex and the mandibles are less prominent. Judging from the material examined *E. lecontei* and *sallei* are entitled to recognition.

A NEW GENUS AND SPECIES OF LAMPYRIDÆ.

By CHARLES W. LENG AND ERNEST SHOEMAKER,

WEST NEW BRIGHTON, N. Y.

The beetle described below was found by the junior author while sweeping in the woods near Glencarlyn, Va., in June, 1912, and was exhibited at an informal meeting of the New York Entomological Society as a rare acquisition the following winter. Since nothing so far described seems to correspond with its characters, even generically, it seems best to publish its description, with a figure, drawn by the junior author, by which it is hoped, other specimens of the same species, perhaps unnamed in private collections, may be brought to light.

NEOCELETES new genus.

This genus will form a new member of the group Lyci, having the middle coxæ distant, prothoracic spiracle with tubular chitinous peritreme prominently elevated, but with the front not prolonged into a beak, antennæ not pectinate. It cannot therefore consist with any

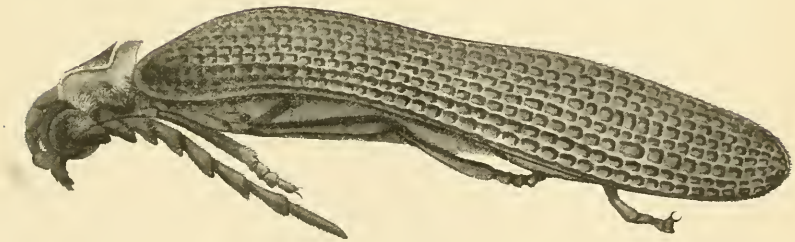
of the genera separated from the old genus *Calopteron* by Leconte.[1] It looks like a small *Celetes,* but differs by the slightly larger eyes, the dense coarse hairs that clothe the body and the crater-like elevation of the disk of the thorax.

Neoceletes crateracollis new species.

Black, mandibles yellow, thorax above yellow, submargin of elytra towards apex faintly pale; densely clothed throughout with short coarse hairs except on the second joint of the antennæ and on the abdomen, the hairs yellow on the thorax, black elsewhere. Elongate, slender, head depressed, scarcely visible from above, eyes globose, prominent, finely granulated, separated by less than half their width; head between the eyes vaguely but deeply channeled, mandibles small, acute, last joint of palpi truncate; antennæ black, densely clothed with short black hairs except on second joint, strongly compressed, serrate, densely punctate; prothorax small, elevated on the disk into a crater-like cell, nearly circular in outline, but slightly angulate behind, superior margin of cell apparently crenulate, densely clothed with hairs, elevation greatest behind, where it is prolonged into a short process projecting over the scutellum; the deeply indented bottom of the cell impunctate, shining; elytra slightly wider behind, rounded at apex, multicostate with a double series of quadrate punctures between the costæ, which are not greatly elevated above the narrow intervals separating the lines of punctures, surface feebly shining, densely clothed with short black hairs. The second joint of the antennæ is short, broader than long, oval, glabrous, third joint as long as broad, succeeding joints gradually slightly longer, eleventh joint feebly appendiculate. The legs are black, compressed, tarsi compressed, claws feebly toothed at base, legs clothed with hairs like the body. Last ventral segment of male long, conical, shining; penultimate segment so deeply divided as to appear only as a pair of plates embracing the last segment; the base of the penultimate segment is concealed by the deeply circularly emarginate preceding segment. Length, 5 mm.

One specimen collected at Glencarlyn, Alexandria County, Virginia, June 23, 1912.

[1] Trans. Am. Ent. Soc., IX, p. 17.



Lycidæ.

NOTES ON ASTENOPHYLAX ARGUS HARRIS. (TRICHOPTERA).[1]

By J. T. Lloyd,

Ithaca, N. Y.

During the hot days of August, when the streams of our fields and gorges are low and warm, if one goes to the alder-swamps to the north or south of Ithaca he will find clear, cool streams maintaining an abundant flow of water. In winter when our deeply frozen nearby streams do not break the snow-cover of adjacent fields, except where narrow dark lines carpeted with anchor ice mark the course of the swiftest riffles, the open waters of the swamp streams show as narrow lines of black contrasted to the snow cover of surrounding thickets. Only in the severest weather a film of ice forms across their most quiet regions and in protected bays along their banks. And when in spring, the snow melts and the freshets come, the surface-fed streams quickly rise to many times their normal volume, their muddy waters overflowing low banks and rushing in deep torrents through gorges, carrying sand and pebbles and grinding with large boulders, the swamp-streams flow quietly on, their clear waters hardly above their August levels and their bottoms of twigs and fragments of vegetable-matter undisturbed by torrents.

Springfed streams are these, whose water pours from the ground at the foot of nearby hills, or seeps from beds of sphagnum in neighboring bogs. Always clear and but slightly affected by changes of temperature or precipitation that completely alter conditions in lakes and rivers, their waters are as nearly uniform as is possible in our changing climate.

As might be expected under these uniform conditions, their inhabitants, unlike most creatures of more changeable streams, alter their habits but little during the seasons. In winter, as in summer, they crawl actively over the bottom, feeding and carrying on their usual activities. In both seasons the stomachs of the species we have examined have been equally gorged.

[1] Contribution from the Limnological Laboratory of the Department of Entomology in Cornell University.

In these alder-bordered streams of our upland swamps lives *Astenophylax argus*, one of the largest and, in the adult, most gaudily colored of all Trichoptera. Its larva and pupa are described in detail on the following pages and, as existing descriptions of the adults are apparently made from dried material, brief notes on their coloration in life are included.

Larval Habit.—The larval cases, Fig. 1, the largest and most bulky in our streams, are constructed of fragments of twigs and bark which vary greatly in size and shape. These fragments, arranged apparently with little regard for system or symmetry, are fastened securely together by means of silk and the tube thus formed is lined from end to end with a tough cylinder of silk. Clumsy and bulky as the larval cases are, they do not vary greatly from cylindric form, nor do they have projecting twigs or corners that would catch during locomotion, nor chunks or stones that would be too heavy for the powerful larvae to drag. In the pupal cases, to be described later, heavy stones and great fragments of bark are used, whose weight and form would make locomotion almost impossible.

The food of the larva throughout the year consists of dead bark and wood rasped from submerged twigs and logs. Specimens collected in February contained the same kind of food as specimens collected in mid-summer, and at both seasons the alimentary tracts were equally gorged.

Pupal Habits.—By the middle of April the larvæ have ceased their activities and have gathered and attached to their cases bulky, heavy material, large pebbles, chunks of bark, the large species of Sphæriidæ, *Sphærium similc*, or twigs, sometimes inhabited by the wood-boring Trichoptera of the genus *Ganonema*. These heavy cases are attached firmly by their cephalic ends to submerged logs, roots or other solid supports. At this time the sieve-nets, perforated sheets of silk across the tube, are spun. In *Astenophylax argus* these sieves are located within the tube a short distance from its caudal and cephalic ends. The mesh varies in size and form, but is roughly hexagonal.

DESCRIPTION OF ADULT, LARVA AND PUPA.

Adult.—♂ and ♀. Length of body 20 mm. Fore wing 25–26 mm. The color pattern and venation of the wings and the male genitalia are illustrated in figs. 2 and 3.

Head.—Brilliant yellow, except a jet black spot at the base of each ocellus. Eyes jet black. Antennæ dark, except basal joint, which is brilliant yellow.

Thorax.—Prothorax brilliant yellow. Thorax above black except a narrow U-shaped line bending to the base of the wings which follows the path of the meso-notal furrow, and the scutellum yellow. Under side of thorax straw color. Legs straw color with yellow coxæ. Wings marked with black and pale salmon; veins pale salmon.

Abdomen.—Straw color.

Larva.—Length of the mature larva is 40 mm. Its breadth at the third thoracic segment is 6 mm.

Head.—The head, except the mandibles which are black, is brown with inconspicuous darker markings which vary somewhat in intensity in different individuals but maintain the same general pattern for the species; the color-pattern and distribution of setæ on the dorsum are shown in Fig. 6; the under side of the head lacks markings except an area of small, somewhat oval, well-defined spots which project forward from its caudal margin on each side of the median line.

Thorax.—The color-pattern and distribution of setæ of the dorsum of the first and second segments are shown in Fig. 3; the under side is weakly chitinized, except for the median thorn on the first segment; the third segment above is weakly chitinized, except for a median glabrous spot near the cephalic margin, on each side of which there is a dark brown mark bearing five or six setæ; farther back and slightly more remote from the median line there is a triangular spot bearing about ten setæ; on each side of the segment there is an elongate glabrous area marked with several brown spots, the cephalic of which bears about a dozen setæ; the second and third thoracic segments bear numerous minute spines which, for the most part, point forward.

Legs.—Brown with darker markings along the edges and around the setæ.

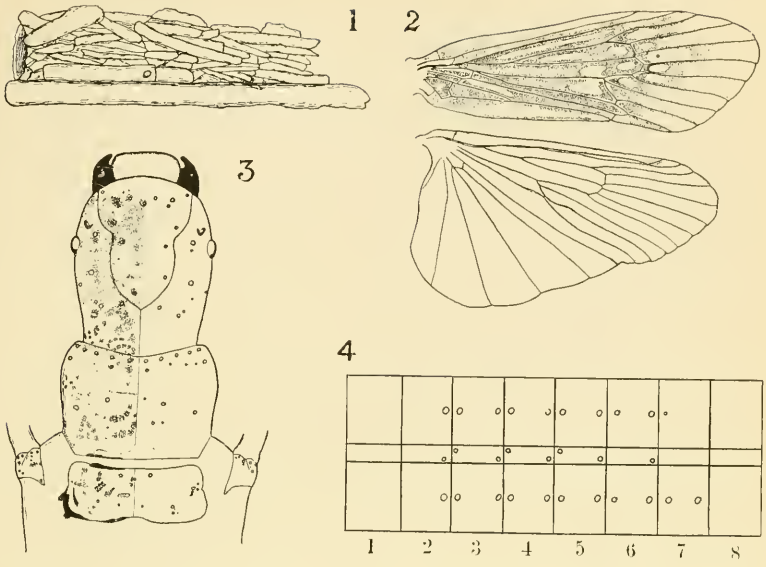
Abdomen.—The first segment above has several circular brown spots surrounding setæ, a glabrous area borders the caudal magin of each lateral hump and a group of four or five fine setæ is present above and below each lateral hump; on the ventral side there are a few scatternig setæ and a bilobed median mark containing four or five setæ in each lobe; the entire surface of the first segment is thickly set with

very minute spines. The lateral fringe of black hair begins near the posterior magin of the second segment and extends to the posterior margin of the eighth segment. The arrangement of gills is diagrammatically shown in Fig. 4. A slight variation of gills occurs on the caudal segments of differerent individuals.

Pupa.—Length 30 mm., breadth 6 mm. The labrum is longer than broad, extending shelf-like over the mandibles and bearing a group of five long, dark colored, hooked setæ on each lobe and two similar setæ, but not hooked, on each side near its base, a shorter seta of lighter color points forward from the cephalic margin of each lobe and a similar seta occurs laterad from each pair of long basal setæ; the mandibles are straight, without teeth and sharply pointed, reaching not quite to the extreme of the labrum, each bears two setæ near its base; the dorsal part of the first abdominal segment is marked with small cross folds, which give it a striate appearance, and is bordered behind with wing-shaped marks, somewhat striate and bearing numerous small thorns on their caudal margin, the lateral fringe is black, commencing near the caudal margin of the fifth abdominal segment and forming a loop beneath the caudal margin of the eighth segment. The antennæ reach to the caudal margin of the sixth segment. The spines on the chitinous plates are serially shown in Fig. 5, but their number and arrangement is subject to variation in different individuals.

EXPLANATION OF PLATE VI.

Fig. 1. Larval case of *Astenophylax argus*.
Fig. 2. Wings of male.
Fig. 3. Larva, head and part of thorax, dorsum.
Fig. 4. Diagram of gill arrangement on left side of abdomen.
Fig. 5. Pupa, chitinous abdominal plates.
Fig. 6. Male genitalia, laterial view.
Fig. 7. Larva, labrum.
Fig. 8. Larva, frons.
Fig. 9. Larva, maxilla and labrum, in part, ventral.



Trichoptera.

NEW MASICERATIDÆ AND DEXIIDÆ FROM SOUTH AMERICA.

By Charles H. T. Townsend,

Washington, D. C.

The following forms, except the last, were collected by the writer in Peru:

Family MASICERATIDÆ.

Subfamily Cylindromasiceratinæ.

CYLINDROMASICERA new genus.

Intermediate in external adult characters between *Masicera, Sisyropa* and *Eumasicera,* with a strong approach to *Metopiops* in habitus and general characters. Description is from female only. Front and face of female of nearly equal width throughout, about as wide as one eye, the eyes descending exactly as low as vibrissae. Cheeks very narrow, about as wide as length of the short second antennal joint. Parafacials very narrowed below and running into the linear orbit, gradually widening above, bare. Parafrontals three times as wide as the narrow frontalia, with sparse fine hairs. Ocellar bristles absent. Two inner reclinate and two outer proclinate orbital bristles on each side. Frontal bristles decussate except the two front pairs, reaching from near ocelli to end of second antennal joint. Facialia strongly ciliate to well short of lowest frontal bristle, on nearly two thirds their extent, the cilia not as long as frontal bristles. Antennæ very long but not quite reaching oral margin, latter slightly prominent and vibrissæ practically on same. Arista thickened on basal third or so, microscopically short-pubescent. Eyes practically naked, only the most microscopic short sparse hairs faintly visible with the 28 magnification of Zeiss binocular in most favorable view. Third antennal joint about four times as long as second. Proboscis very short and fleshy, palpi widened apically. Length of head at vibrissæ about one-half that at base of antennæ, the latter inserted above eye-middle.

Two sternopleural and three postsutural bristles. Two strong lateral pairs of scutellar bristles, and a bristle between them on each side

half as long; one short suberect apical nondecussate pair, and one separated short discal pair. First abdominal segment with a short lateral macrochaeta, and an atrophied median marginal pair hardly stronger but longer than the bristly hairs; second segment with an erect strong median marginal pair, and one or more lateral; third segment with erect marginal row of eight above and more below; anal segment with erect short marginal, and erect discal rather irregularly placed. Scutellum with sparse erect hairs, abdomen with appressed hairs on first three segments. Hind tibiæ pectinate, claws short. Apical cell narrowly open a little before wingtip, costal spine almost completely atrophied; fourth vein rounded at bend, last section gently bowed in; hind crossvein only a little nearer to bend than to small crossvein and almost straight.

Reproductive habit, leaf-oviposition of subcylindrical microtype eggs.

Type, *Cylindromasicera prima* n. sp.

Cylindromasicera prima new species.

Length of body, 6 mm.; of wing, 4.5 mm. One female, taken on herbage in the valley of the Rio Chira near Sullana, February 17, 1912.

Obscure blackish, silvery to brassy pollinose. Face and front silvery, the parafrontals faintly golden on inner half or so. Frontalia dark brown. Antennæ dusky, except base of third joint and end of second pale yellowish. Palpi dusky. Occiput dusky-cinereous, with sparse grayish pile. Pleuræ, thoracic scutum and scutellum silvery with a golden shade; the two inner vittæ of mesoscutum narrow, the outer ones heavy and interrupted. First abdominal segment blackish, faintly silvery in some lights; second and third segments faintly golden, slightly more so than the thorax, their hind margins obscurely and indefinitely blackish; anal segment wholly a little more deeply golden. Legs wholly blackish. Wings clear; tegulæ white, the hind scale slightly tinged with tawny on border.

Type, TD4079 (fly, uterus, slide of eggs and maggots).

Subfamily MASICERATINÆ.

DIMASICERA new genus.

Small shining species. Front of female about width of one eye or slightly wider, and nearly same width throughout, being about equal to facial width; that of male width of one eye or less posteriorly, and

widening anteriorly, the face being nearly one and one half times eye-width, but small males often have frontal and facial proportions nearly same as in the female. Facial plate sunken, deeply depressed. Cheeks very narrow, the eyes descending almost as low as vibrissæ in both sexes. Parafacials very narrow below, widening rapidly above, bare. Frontalia narrower than parafontals, the latter with fine hairs. No ocellar bristles, only the usual hairs. Male with two reclinate inner orbital bristles of same strength and reclination as vertical bristles, conspicuously stronger than the frontal bristles; female with same, and in addition with two proclinate outer orbital bristles, the anterior inner orbital in profile set between the two outer orbital. Eyes thickly short-hairy. Facialia in male strongly and thickly ciliate about as high as origin of arista, those of female less thickly and conspicuously so and not reaching as high. The frontal bristles of male are usually stronger and more thickly placed than those of female; they descend nearly or quite to base of arista in female, but usually somewhat lower in male. The cilia of facialia are about same length and strength as frontal bristles. Antennæ reach oral margin in male, but are a little shorter in female; second joint short in both sexes, the third joint of male nearly or quite five times as long as second. Arista about as long as third antennal joint of male, thickened on about basal two-fifths, bare save for microscopically short pubescence, basal joints very short and inconspicuous. Oral margin slightly notched in middle, not prominent, seemingly cut off but with a turned edge; facial profile quite strongly receding, the length of head at vibrissæ half that at base of antennæ in females and small males and still less in large males. Vibrissæ slightly below level of median notch of oral margin, being close on oral margin laterally. Palpi normal, reaching end of proboscis when latter is retracted, a little thickened apically. Proboscis very short and fleshy.

Two sternopleural and three postsutural bristles. Thorax a little narrower than head but hardly wider than base of abdomen. Scutellum with a small pair of erect or suberect nondecussate apical bristles, two strong lateral bristles with a weak one between them, and a weak separated discal pair. Abdomen subovate, only slightly elongate. No discal bristles on first three segments; first segment with no median, but with one weak lateral; second segment with one lateral bristle and one median marginal pair; third segment with marginal row of

six above, and one or two more below; anal segment with short marginal bristles, and still shorter erect discal bristly hairs. Wings reaching beyond tip of abdomen, rather broad, costal spine exceedingly minute and practically undeveloped; apical cell very narrowly open a little before wingtip; fourth vein abruptly rounded at bend, its last section weakly bowed in; hind crossvein sinuate and nearly in middle between small crossvein and bend of fourth vein; two or three bristles at base of third vein, rest of veins bare. Claws of both sexes very short and delicate. Legs not elongate; hind tibiæ of both sexes weakly pectinate, with a slightly longer bristle near middle.

Reproductive habit, leaf-oviposition of microtype eggs.

Type, *Dimasicera nitida* n. sp.

This genus has but two spermathecæ.

Dimasicera nitida new species.

Length of body, 4 to 5 mm.; of wing, 3 to 4 mm. Five females and fifteen males, taken on herbage in valley of Rio Chira, near Sullana, February 17, 1912. Both sexes vary about equally in size.

Shining black; face, front and orbits silvery in oblique view; frontalia soft dark brown, occiput soft blackish; the silvery of parafrontals and parafacials rather more conspicuous in male. Occipital hairs scant, blackish. Antennæ and palpi soft black. Thorax faintly silvery, the four vittæ narrow and faint, pleuræ more strongly silvery. Second and third abdominal segments narrowly silvery on front margin. Wings clear. Hind scale of tegulæ smoky-yellowish to yellowish-smoky, the small front scale white except on hind margin.

Type, TD4075 (fly, egg, maggot, reproductive system). A cotype female is TD4076.

Subfamily SALMACIINÆ.

Atacta brasiliensis Schiner. (Synonym, *Atacta apicalis* Coquillett.)

It seems practically certain that Coquillett's species is a synonym of Schiner's. As all the descriptions are brief and defective, the following notes may be supplied: Second and third antennal joints normally equal in both sexes, the antennæ being slightly longer usually in the female. Male front at vertex only one third of eye-width or even less, female front nearly twice or fully one and two thirds times eye-width. Female with four proclinate orbital bristles on each side, and one or two reclinate ones behind them. Three strong marginal pairs of scutellar bristles, the apical pair slightly decussate. Four to six sternopleural and four postsutural bristles.

Several females taken February 17, 1912, and later, on herbage in valley of the Rio Chira at Sullana, in the northern coast strip of Peru; and both males and females taken the first week in April, 1912, on flowers of *Asclepias curassavica* and *Baccharis* sp. in the valley of the Rio Casma above Casma town, in the center of the Peruvian coast strip. One of the Sullana females is TD4077 (fly, reproductive system, egg).

Family DEXIIDÆ.

Subfamily Sardioceratinæ.

PARATHERESIA new genus.

Allied to *Euthercsia* and *Sardiocera*. Description is from the female. Front and face gradually widening from vertex, which is about equal to eye-width. Frontalia much widened on anterior half; parafrontals of nearly equal width throughout, but a little wider in front than at vertex; parafacials wide, slightly wider than anterior width of parafrontals, bare. A single row of weak frontal bristles stopping at root of antennæ; two proclinate orbital bristles; a rather short pair of divergent ocellar bristles with other divergent bristles behind them; a row of microscopic hairs on parafrontals about in line with orbitals and approximated to eyes. Facial plate only a little wider than one parafacial, not constricted below, the epistoma fairly produced, the vibrissæ but slightly above oral margin. Facialia bare save about three bristles next vibrissæ. Second antennal joint hardly elongate, the third fully twice as long; arista thinly plumose; second antennal joint bearing a long bristle in front. Proboscis when extended about as long as head-height, moderately stout, rather horny but labella well developed; palpi well developed, club-shaped. Cheeks fairly wide, about two fifths of eye-height. Eyes bare.

Three sternopleural bristles, the middle one weaker; four postsutural bristles. A short apical decussate pair of scutellar bristles, a pair of separated discal bristles of same strength, and two strong lateral bristles. No macrochætæ on first two abdominal segments except weak lateral ones; third segment with six strong marginal ones in a median pair and a lateral pair on each side; fourth segment with a submarginal row of about six weaker ones. Legs moderately slender, normal, claws but little elongate; hind tibiæ faintly short-

pectinate, with a longer bristle near middle and another near tip. Apical cell widely open very distinctly before wingtip but only a little removed from same. Apical crossvein bowed in, its junction with fourth vein approximated to wing-margin; fourth vein continued in an extremely short stump, hind crossvein nearer to apical crossvein. No costal spine.

Reproductive habit, larviposition probably in choria as near to the host as the fly can approach.

Type, *Paratheresia signifera* n. sp.

Paratheresia signifera new species.

Length of body, 8.5 mm.; of wing, 7 mm. One female, taken on trunk of tamarind in valley of Rio Chira near Sullana, March 2, 1912.

Parafrontals and parafacials thickly light golden pollinose; frontalia light brown with a tawny-gray sheen, facial plate tawny-silvery antennæ and palpi reddish-yellow, arista black, cheeks and orbits faintly golden, occiput cinereous. Pleuræ silvery, mesoscutum and scutellum thickly cinereous pollinose, mesoscutum with three heavy complete uninterrupted shining black vittæ. Abdomen back, shining, with silvery pollen above and below leaving the hind borders of segments and a faint median vitta blackish; dorsum and tip of anal segment yellowish-red and without pollen, the base obscurely blackish. Legs blackish; wings clear, tegulæ white.

Type, TD4082 (fly, reproductive system, slide of maggots).

Subfamily DEXIINÆ.

Tribe *Dexiini.*

Aglummyia percinerea flavida new subspecies.

Length of body, about 8 to 8.5 mm.; of wing, 7 to 8 mm. Chosica, about 3,000 feet, one female February 14, and one male October 19, 1913.

Differs from the typical form in the tawny-yellowish abdomen in male showing a broad median vitta of brown on first two segments, spreading over all of last two segments except front corners of third. In the female the brown covers also the second segment. The front shows no yellowish tinge. Tibiæ of female concolorous with femora. The size is larger.

Type, the female. The male is TD4188 (fly, male reproductive system).

Tribe *Echinodexiini.*

TROPIDODEXIA new genus.

Allied to *Bathydexia,* and having nearly same style of spinelike bristle setting as *Tropidopsis* of the Pyrrhosiinæ. Description is from

the female. Differs from *Bathydexia,* as described by Brauer & von Bergenstamm[1] as follows: Abdominal macrochætæ arranged much as in *Tropidopsis* and of same character, not being strongly or heavily spinelike; those of second segment disposed closely in middle and on hind border, those of third segment less closely placed but covering whole dorsal surface, those of anal segment not so strong. The third antennal joint of female is less than twice as long as second, and about three times as long as wide. Facial carina is of moderate strength, widened and flattened on distal portion, proximal end much narrowed where it enters between the bases of the antennæ. Parafacials bare. No wrinkle or stump at bend of fourth vein. Other characters are as follows: Cheeks very wide, being a little less than eye-height. Facial plate constricted by vibrissal angles, which are high above the unprotruded oral margin. Facialia bare, parafacials nearly as wide as long. Second antennal joint with two long bristles on front edge. Arista plumose; eyes bare. Frontalia very wide, with two long and very strongly proclinate orbital bristles set close to their lateral borders posteriorly, the posterior one being a little in front of the strongly proclinate and long ocellar bristles. Proboscis is about as long as head-height, strong, labella well developed; palpi slender, stout-filiform, reaching to oral margin.

Three sternopleural and four postsutural bristles. Two strong lateral scutellar bristles, and a slightly shorter decussate apical pair. Abdomen widened and swollen, very short-oval, rather densely set with subspinelike macrochætæ. Bend of fourth vein very closely approximated to wing-margin, last section deeply bowed in. Hind crossvein gently sinuate, nearer to bend of fourth vein.

Reproductive habit, larviposition probably in choria as near host as fly can approach; maggots uncolored.

Type, *Tropidodexia lutzi* new species.

Tropidodexia lutzi new species.

Length of body, 3.5 mm.; of wing, same measurement. One female, near Rio de Janeiro, south Brazil, collected by Dr. A. Lutz, probably in December or January, and sent in liquid.

Head wholly cinereous pollinose, frontalia brown, third antennal joint and arista blackish, second antennal joint and base of third yellowish-red, palpi reddish-yellow. Facial plate with a tawny tinge, especially on epistoma.

[1] Musc. Schiz., pt. III, pp. 172–173.

Thorax blackish, faintly cinereous pollinose, the pollen whiter on mesoscutum which shows the usual four rather narrow interrupted vittæ. Scutellum brown. Abdomen black, subshining with only very faint suggestions of tawny pollen which is more noticeable on anal segment. Legs blackish, tibiæ reddish in middle, claws moderately elongate, pulvilli pale yellowish, front femora pollinose outwardly. Wings rather evenly infuscated, more deeply so on extreme base, two lighter streaks in submarginal and second posterior cells. Tegulæ wholly deeply smoky-infuscate, rather pearly-fuscous.

Type, TD4081 (fly, reproductive system, slide of maggots).

MISCELLANEOUS NOTES.

Change of Generic Names.—According to the generally accepted law of priority a number of generic names of Coleoptera have been changed and adopted for quite a time already in European lists and catalogues, while American coleopterologists still follow the rather antiquated Henshaw list.

The change has affected certain families more than others. In the old family Trogositidæ, of which I have a revision nearly ready, only three generic names remain, *Nemosoma, Calytis* and *Thymalus,* the rest are changed and some new names added.

The species in our list included in the genus *Nemosoma* do not belong there but in the genus *Corticotomus* Sharp as I have already pointed out on several occasions. Our North American species must be absent in European collections otherwise Reitter, Sharp, Léveillé and others would have noticed and corrected the mistake long ago.

The only described North American species of *Nemosoma* is the one described by Fall as *Pseudalindria fissiceps.*

Airora Reit. has to be used instead of *Alindria.* Reitter separated long ago the species of the new world from those of the old world on the form of the antennal club which is dilated only on one side in the former and on both sides in the latter.

Temnochila Westw. is to be used for the species listed as *Trogosita.*

Tenebroides Pill. & Mitterp. for *Tenebrioides.*

Calitys Thoms. remains unchanged.

Ostoma Laich. for the species in our list under *Peltis* and *Grynocharis,* except *G. pilosula* Cr.

Ostomodes Reitt. erected by Reitter for the species *Grynocharis pilosula* Cr. and mainly founded on the supposed toothed claws, which however, was an error. Léveillé calling attention to the mistake rejected the genus but later restored it again.

Lophocateres Oliff. with one species *L. americanus,* described by Motschulsky from New Orleans, is to be added.

Thymalus Duft. remains unchanged.

Lycoptus Casey. A genus of doubtful position which was first placed by its describer in the Colydiidæ and later in the Trogositidæ. It is unknown to me.—Chas. Schaeffer.

A Long Island Ants' Nest Eighteen Feet in Diameter.—On the slope leading down to the southerly shore of Deep Pond near Wading River, the writer found on July 26, 1914, a nest of *Formica fusca* rar. *subsericea* Say eighteen feet in diameter. In the other direction it was somewhat broader, about twenty feet. This is the largest nest of the species I have ever found. Many of the ants came out when I walked across the nest in measuring it, and attacked me. Sometimes these ants, when the nest is small, do not show such courage. The nest of this species is usually not high and mound-like, as is that of *Formica exsectoides* Forel, which also occurs at Deep Pond, but is more spread out over the ground and is generally about two or three inches high. The large nest here referred to is in open woods of pines and oaks, in a not very sheltered position, and does not receive as much sun as it would have had on the opposite side of the pond. Mr. Charles Schaeffer later viewed the nest and agrees with me that it appears to be the work of but one colony.—WM. T. DAVIS.

Slides of Wings of Macrolepidoptera.—I have found the following method convenient for preparing slides of the wings of Macrolepidoptera, and fairly good for Pyralids and Pterophorids. (1) Remove wings of right side carefully. The frenulum is less apt to be broken if the wings are removed together and separated later. (2) Wet with alcohol. (3) Transfer to Labarraque or Javelle solution. I find both are equally good, but either must be fresh enough to work quickly or the stain will not take smoothly. (4) Wash thoroughly with water or alcohol or both. (5) Leave 12 to 36 hours in a stain composed of 5 per cent. by weight of sodium eosin (for instance

Grubler's eosin w.g.) dissolved in 70 per cent. alcohol. (6) Rinse thoroughly in alcohol to remove the excess stain. I use two changes of 95 per cent. and one of absolute alcohol as a rule, but the last is not really necessary. About ten minutes in the 95 is usually right. The absolute has very little effect on the stain but seems to make clearing surer. (7) Transfer to a slide and wet with a couple of drops of oil of lavender. Let stand a couple of minutes to let the water and alcohol evaporate, blot off excess lavender. (8) Add balsam and cover.

If the veins are not strongly stained leave longer in the stain, as is penetrates slowly. If stronger contrast and clearer membrane is desired the slide may be cleared with concentrated carbolic acid in place of lavender (Mr. Grossbeck's method), but there is a little danger of washing out the slenderer and rudimentary veins entirely. A more dilute solution of eosin often works well, but must be given plenty of time. Bleaching is hardly needed with light-winged moths, like most Geometridæ. An unsatisfactory slide can be soaked out in xylol, the wings rinsed an hour or two in absolute alcohol and re-stained.

I do not find the method works quite as well with Tineids, and prefer to denude and mount them dry.—WM. T. M. FORBES.

Some Miscellaneous Local Records of Lepidoptera.—A single male specimen of *Polygonia faunus,* W. H. Edw., in fresh condition, was captured on July 6, 1914, by my brother Edward, while on a collecting trip with Mr. G. C. Hall. The specimen was taken along a road, about one mile west of Mashipacong Pond, Sussex Co., N. J. Altitude about 1,200 feet.

The only other definite local record, according to the New Jersey State List, is Schooley's Mountain (Aaron), the record, Westwood (Mitchell) being an error.

Anatrytone vitellius, Fabr. is a typical species and would not appear under the above title, but for the fact that our local form has been listed under this name. The writer captured specimens of *vitellius* in Porto Rico last July and they are certainly distinct from the next species.

Anatrytone logan, W. H. Edw., our local species, has been variously listed as *vitellius,* Fabr., *delaware,* W. H. Edw., and *logan,* W. H. Edw. We prefer to use the name *logan,* as it has page precedence

over *delaware*. Most of the writer's local specimens were taken at Jamesburg, N. J.

The remaining North American species of *Anatrytone* (Dyar) are, *A. arogos,* Bd. and Lec. (sometimes confused with *vitellius,* Fabr.) and *A. lagus,* W. H. Edw. *A. arogos,* also occurs locally.

Monoleuca semifascia, Walk. Dr. H. G. Dyar, in JOURNAL N. Y. ENT. SOC., XXII, 223, describes the larva of this species, and lists it as a New York insect, basing this conclusion on the Morris Plains, N. J. (Neumoegen) record,[1] and on the occurrence, at different times, of other southern species of this group, in New York State.

To the above evidence, we would like to add the following. On July 11, 1902, four specimens were taken at South Lakewood, N. J., by the writer. They were taken at night upon a screen door and were attracted by the lights of the dwelling. Two of these specimens are now in the Staten Island Museum and one in the American Museum Local Collection. We also have, in this museum, a Henry Edwards specimen, with a New York label.

For convenience we repeat the additional records in the 1909 New Jersey State List. Palisades (Joutel): Lakehurst, July 12 (Buchholz); Larva in New Jersey (Joutel).—FRANK E. WATSON.

PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING OF NOVEMBER 3, 1914.

A regular meeting of the New York Entomological Society was held November 3, 1914, at 8:15 P. M., in the American Museum of Natural History, Pres. Dr. Raymond C. Osburn in the chair, with 14 members and one visitor, Mr. M. S. Crosby, of the Linnean Society, present.

Mr. Davis spoke of his visit, October 8, with Mr. Shoemaker, to Lakehurst, N. J., and of the enthusiasm of the latter on this first visit to that locality. Notwithstanding the dry weather, the collecting was good; eight species of tiger beetles were caught, *tranquebarica, rugifrons, modesta* and *punctulata* in numbers, and one each of *generosa, consentanea, repanda* and *12-guttata. Sandalus niger,* differing by its conical thorax from *S. petrophya,* reported previously by Mr. Schaeffer, was taken, and constitutes, in conjunction with the specimens heretofore reported from the Palisades, an addition

[1] See Smith's Insects of New Jersey, 1899.

to the New Jersey List. The oak trees, as shown by photograph, were completely defoliated in places by the larvæ of *Anisota senatoria,* presenting the deceptive appearance of having been eaten by *Dendrotettix quercus.* Much attention was paid to sugaring and by day the sugared trees were found to be frequented by numbers of *Vespa* and *Polistes* and, attacking these, by many wheel bugs, *Arilus cristatus.* On high huckleberry bushes the "cowsheds" of the ant, *Cremastogaster lincolata pilosa,* built over coccids were observed, In the Orthoptera, the true Katy-did was found but with the song apparatus nearly worn out. Perching high in the trees these insects would be difficult to catch except for their habit of falling straight down when disturbed. The method employed in collecting was to touch the insect, when discovered at night by the aid of a lantern with a long stick or a fishing pole might be used, thus causing it to fall into the ready net. *Orchelimum minor* was detected by its short buzzing song and was also caught at sugar. *Conocephalus liristes* was heard singing in the cranberry bogs. As a sequel to the Camp at Lakehurst, Mr. Davis showed a photograph of the chestnut tree under which eighteen entomologists camped, now attacked by the chestnut blight, *Endothia parasitica,* and apparently doomed, though standing five miles from any other chestnut. Mr. Davis showed a branch injured by chafing against another through which the spores, carried doubtless by birds, as already recorded, had entered.

Mr. David spoke also of the *Lepidoptera,* his remarks being recorded in Miscellaneous Notes, and exhibited photographs.

Mr. Shoemaker endorsed Mr. Davis's enthusiastic comments on the excursion, stating that in three nights, sugaring about 180 noctuids, representing 35 species, and about 20 species of beetles were taken. The sugaring at night and long walks by day made it hard work, fully repaid, however, by the capture of about twelve specimens of *Homoglœa carnosa,* one at sugar, the remainder on huckleberry leaves, where the reddish color of the moth so closely resembled that of the autumn leaves as to make their discovery difficult. Mr. Shoemaker exhibited a pair of each of the species he had caught and a specimen of the southern beetle, *Cymindis elegans,* found under a stone, and previously known from New Jersey by two specimens taken at Atco by Mr. Liebeck.

Mr. Dow remarked, in a somewhat humorous way, that the enthusiasm of the Lakehurst visitors, while well founded, should not lead to the drawbacks of thirst, long tramps in the sand, and danger of losing the road being forgotten.

Mr. Davis spoke of the danger of the molasses used in sugaring becoming fermented sufficiently to cause explosion of the can and described such an incident at Lakehurst.

Dr. Forbes spoke of the interest he took in tracing the species peculiar to Lakehurst northward, mentioning in that connection the occurrence of *Prionaptery.x nebulifera,* a moth whose larva constructs a tube of silk and sand at base of stalk of huckleberry bushes, on the southern shore of Massa-

chusetts. He said Cohasset, Mass., should be a specially interesting locality in that connection, for though far from thoroughly collected, it had already yielded many species not known elsewhere in the state. He also mentioned that in plants some Carolinian species had been found as far north as Bay St. George, Newfoundland, by Fernald.

Mr. Davis reminded the Society that he had recorded the finding of *Prionapteryx* at Yaphank, Long Island.

Mr. J. W. Angell exhibited a larva found in hickory and spoke of Nepperhan, near Yonkers, as a good collecting ground where he had found the larvæ of *Xyloryctes satyrus* in ash.

Mr. Woodruff recorded *Leptura exigua* found at Hewitt, N. J., June 21, on flowers of *Cornus paniculata*, as new to the New Jersey List; also *Leptinus testaceus*, a single specimen found April 27, at Bronxville, N. Y., in sifting the debris of a mouse nest at the foot of a stump; and spoke of the abundance of *Vanessa cardui* in August and September, and of finding *Euptoieta claudia* at Fox Hills, Staten Island, in September.

Mr. Leng read a letter from Mr. Harris reporting his examination of Col. Casey's collection of Cicindelidæ.

Mr. Leng spoke of *Calosoma sycophanta*, a European Carabid beetle, having been introduced successfully in eastern Massachusetts to combat the gypsy moth and called attention to the mention of this beetle at Taunton, Mass., by Mr. Easton in the bulletin issued by the New England Federation of Natural History Societies.

Mr. Hall spoke of four days spent at Aurora, W. Va., June 19 to 23, where he found *Argynnis* swarming at an elevation of about 2,800 ft. There were literally thousands of these butterflies in sight, fluttering about flowers of dogbane, *Argynnis aphrodite* outnumbered *cybele* three to one. In reply to Dr. Forbes, Mr. Hall said no *A. alcestis* were observed.

Mr. Davis quoted a statement that when *Vanessa cardui* is common, other butterflies are scarce, but doubted its accuracy.

Mr. Watson said just the contrary would be nearer the truth.

Dr. Osburn exhibited Tabanidæ and Syrphidæ received from E. M. Anderson, curator of the Provincial Museum in British Columbia, partly at Atlin, 100 miles inland and near the northern boundary of the province, and spoke of their distribution, particularly of those inhabiting Europe and Asia as well as America.

A general discussion of holoarctic distribution by Messrs. Davis, Olsen and others followed Dr. Osburn's remarks.

Mr. Olsen mentioned the occurrence of the European aphid, *Callipterus betulæ* at Honesdale, Pa., November 23, 1913, and of the European Capsid, *Pithanus mœrkeli* at Maspeth, Long Island.

MEETING OF NOVEMBER 17, 1914.

A regular meeting of the New York Entomological Society was held November 17, 1914, at 8:15 P. M., in the American Museum of Natural His-

tory, President Dr. Raymond C. Osburn in the chair, with thirteen members present.

Mr. Mutchler described the route followed by Mr. Watson and himself in northern Florida, leaving New York September 24, arriving in Gainesville September 26, working there with Mr. J. R. Watson, entomologist of Florida Agricultural Station, for five days; thence to Monticello for an examination of the cypress swamps, the shores of Lake Miccosukee, etc.; thence to Pensacola with a short stop at DeFuniak Springs. While in Pensacola the collecting was done principally at Fort Barrancas, reached by trolley car. On the return journey, another stop was made at DeFuniak Springs and two days were spent at Crest View, by which time, October 15, it had become cold. The Cicindelidæ found were exhibited and emphasis laid on the conditions under which *C. nigrior,* hitherto unknown from Forida, was found, viz.: outside the woods and between them and the railroad track; within the woods the allied *C. unicolor* was found. Mutchler said that while 7,000 to 8,000 specimens were caught, the result was unfavorably affected by the cold weather.

Mr. Watson exhibited numerous photographs and pictures, showing the character of the environments, particularly on the road leading south from Gainesville to Payne Prairie, a flat region, formerly covered with water, and among the sinks which characterize the region. The pond east of the town, the hammock of magnolia, live oak, etc., in the University Grounds, and the road west of the town were also shown; on the latter large groups of Pieridæ gathered about horse dung, comprising three species, *eubele, nicippe, proterpe.*

The photographs taken at Monticello showed the detail of the cypress swamp and the arms of the lake choked with aquatic plants, as well as the rich woodlands there encountered and groves of pecan trees. In the photographs taken at Pensacola, the locality for *Cicindela unicolor* was shown, also the pines and palmettoes which are prominent in the scene. The pictures of DeFuniak Springs showed the big spring, Lake Stanley, the open pine woods, the partly cleared land with oaks, and Mr. Mutchler sifting. The environment for *Cicindela nigrior* was shown in the Crest View photographs. Mr. Watson said the best collecting for butterflies was at Gainesville, where 58 species were taken, to which number only 12 species were added later, though he held the little sunken meadows found in the flat woods or open pine woods further north in affectionate remembrance for what they had yielded.

Mr. Mutchler spoke also of the number of *Deltochilum* taken in meat trap at Gainesville.

Dr. Forbes exhibited a number of examples of Syntomidæ and Arctiidæ and spoke of their "Local Variations in the West Indies," pointing out twenty-one instances of intimate relationship with South America, six of similar relationship between Cuba and Florida. As his remarks will be published later, they are not further reported here.

Mr. Shoemaker exhibited a new species of Lampyridæ, group Lyci, taken at Glencarlyn, near Washington, D. C., a favorite collecting place of Nathan

Banks, where a stream runs through a partly swampy area, between wooded hillsides. He also showed the drawings he had prepared to accompany the description to be printed later in the JOURNAL.

Mr. Barber said he also knew the locality and had taken a new species there.

Mr. Leng read a letter from Mr. Schwarz in which it was pointed out that while no *Silpha* or *Necrophorus* were known from the West Indies, there had been found in Porto Rico and Cuba, representatives of the smaller Silphidæ.

A letter from Mr. Dow was read correcting the paper on John Abbot of Georgia, by making it appear probable that he was in Georgia previous to 1790.

Mr. G. W. J. Angell exhibted the Nat. Geog. Mag. for July, 1914, containing a plate of Carabini experimentally introduced in Massachusetts, to combat the gypsy moth, and stated that *Calosoma sycophanta* alone had been found useful because its larva appeared to be the only one climbing the trees for larvæ.

Mr. Davis commented upon the number of adult *Calosoma frigidum* he had found climbing on Long Island.

Mr. Wintersteiner exhibited the remarkable monograph of *Microlestes* by K. Holdhaus, in which excellent figures of our species of *Blechrus, Dromius* and *Metabletus,* showing genitalia, are given.

MEETING OF DECEMBER 1, 1914.

A regular meeting of the New York Entomological Society was held December 1, 1914, at 8:15 P. M., in the American Museum of Natural History, President Raymond C. Osburn in the chair and eighteen members present.

Mr. H. G. Barber read a paper on "Collecting Insects in Porto Rico," while Mr. F. E. Watson showed illustrations of the places referred to. Owing to the dense population of the island, and close cultivation of the soil, collecting was confined largely to the edges of cultivated fields, along the roadsides and in and about the occasional patches of woodland. At San Juan, the Insular Fair Grounds, reached in 20 minutes, proved an excellent collecting ground, having been allowed to grow up in weeds, and an extensive tract of more or less waste land adjoining belonging to the old Porto Rican fortifications was also good. Excellent collecting was also found along the beach and among the cocoanut palms at San Turce. The mangrove swamp at Catano, reached by ferry, did not yield so much. Aibonito, at an elevation of 2,500 feet in the mountains of the interior was reached by automobile stage, and there the Borinquen hotel and the collecting proved equally satisfactory. Excellent sweeping and beating were found about the edges of the woods and in the thickets, butterflies and dragonflies were abundant; wooded hills and open fields, due to fewer people, provided better conditions than were subsequently found in any other locality. The nights in these mountains were almost chilly. At Coamo Springs, further along the same stage route, and still in the mountains, the extreme dryness and high winds oper-

ated unfavorably, though good collecting was found along the moist bank of the river, where apparently insects had congregated. The same result seemed to be indicated by the collecting in the dry bed of a stream, where the few rockbound pools and muddy spots afforded good collecting. Sifting, turning boards, etc., proved unprofitable here and elsewhere, presumably on account of the abundance of insectivorous centipedes, lizards, etc.

Leaving the mountainous interior after ten days' collecting there, the party spent a few days at Ponce, finding good collecting at a little place called Tallyboa, reached easily by train, where enormous cactus and century plants abounded. Mr. Barber pointed out that on the southern side of the island, near Ponce, the coastal plain is usually sandy with only an occasional marsh, quite different in this respect to the abundant mangrove swamps of the northern shore.

There is much cultivated land, especially sugar cane, with little other vegetation and few waste places, while the open fields and denuded hills are equally unfavorable to insects in their wind-swept dryness.

The next station, reached by railroad, was Mayaguez, where the U. S. Experiment Station was placed at the disposal of the travelers and the entomologist R. H. van Zwaluenberg pointed out good collecting places.

The results were excellent although the most ambitious excursions, climbing back into the mountains, was rather unproductive, from lack of time, for collecting purposes.

Following around the western and northern coast back to San Juan, the only stop was made at Arecibo, where again the dry season prevented the best results.

In closing, Mr. Barber spoke of the kindness of Major Dutcher and of the staff at the Porto Rican Experimental Station at Rio Piedras, near San Juan; and promised to review the scientific results of the month's work at a future meeting.

At the close of his remarks, Mr Watson exhibited a large number of the butterflies, of which large series had been obtained and spread.

The paper was discussed by Mr. Davis, who commented on the uniformly smaller size of some species as compared with American examples, by Dr. Osburn and Messrs. Angell and Engelhardt. In reply to their questions, Mr. Barber said collecting at lights was not very satisfactory in the towns on account of interference by people.

Mr. Leng and Mr. Davis jointly described a recent visit to Ithaca, speaking of the methods used in the collections and of the large staff of entomologists there occupied in teaching and research work. The numerous ravines and waterfalls and the more northern character of the locality were shown by photographs, and Mr. Davis commented on the uniformity of the rocks as compared with the varied glacier-born rocks of Staten Island. The block system used in the collections was explained, also the tents devised by Professor Needham for environmental study. Mention was also made of the three places that had been selected for field work in the western part of

the State next season, in connection with the proposed New York State List, viz: Salamanca, Westfield and Batavia. Both speakers expressed their gratitude for their kindly reception by the members of the faculty.

Mr. Dow presented portraits donated by Dr. Walther Horn, of Berlin, of the following entomologists, viz: Roger, Westwood, Redtenbacher, Satzuma, Faust, Herrich-Schaeffer and Kiesenwetter, also a colored representation of a meeting of the Passaliden Club.

A portrait of Mr. Barber was also added to the collection.

Mr. Schaeffer spoke of an exchange of publications requested by the Hof Museum of Vienna, which on motion was referred to the publication committee.

Dr. Osburn exhibited Odonata from Atlin, B. C.; his remarks thereon will be printed in Miscellaneous Notes.

Mr. Dickerson exhibited *Coloboptcrus excisus* Hagen, taken at Blue Anchor, N. J., July 3. The only record in Smith's List for this species is Belmar, July, one specimen (Johnson). Mr. Schaeffer said it had however been found by Mr. Schott and Mr. Davis added the following from his collection, viz.: Lakehurst, N. J., July 9.

Mr. Dickerson also exhibited a croton bug (*Blatella germanica*) taken in Newark, the young of which had hatched while the egg mass was still partly within the body.

Mr. Davis said while it was more usual for the egg mass to be deposited before the young hatched, instances of both methods were known, in which statement he was corroborated by Mr. Schaeffer.

Colonel Casey's gift of Memoirs V was exhibited and commented upon by several members.

MEETING OF DECEMBER 15, 1914.

A regular meeting of the New York Entomological Society was held December 15, 1914, at 8:15 P. M., in the American Museum of Natural History. President Dr. Raymond C. Osburn in the chair, with ten members present.

Mr. Dow proposed Professor Nicholas E. Crosby of 62 West 56th St., New York, for active membership. On motions of Messrs. Engelhardt and Barber, the by-laws were suspended and Professor Crosby was immediately elected by an affirmative ballot cast by the secretary.

The president appointed Messrs. Davis, Sleight and Mutchler as a committee, to nominate candidates for officers for the ensuing year.

Mr. Engelhardt under the title "Entomological Excursions in the Bahamas" read a paper illustrated by about 100 lantern slides, descriptive of the islands he visited, New Providence, Andros and Abaco, their vegetation, industries, people and scenery, ending with remarkable submarine pictures of the sea bottom showing corals, seafans, fish, etc. The forests of pine on Abaco, recently commercially developed, were shown as one of the good collecting places, and the old-fashioned coral rock roads of New Providence,

with the thatch-roofed huts of the negroes half hidden in tropical vegetation as another, especially favorable for Orthoptera. The inland lakes, and the deep pools of brackish water, rising and falling with the tide, were also good, and in the latter particularly, Gyrinidæ were noted. Small sandy cays with a growth of cocoanut palms were also visited and found productive, but the beaches were clean and unproductive, as were the mangrove swamps and the seagrapes. Mr. Engelhardt exhibited a number of the insects he caught and remarked particularly on the abundance of the *Stegomyia* mosquito, and of a number of Lepidoptera which have a general distribution over sub-tropical American regions. *Papilio bonhotei,* named for Mr. L. L. Bonhote, secretary to the former governor, Sir Gilbert T. Carter, both having been ardent collectors, is the only endemic species so far known, and is at best only a varietal form of the West Indian *P. andræmon.* Other typical species shown were *Danais plexippuus, Agraulis vanillæ, Euptoieta hegesia, Phyciodes frisia, Anartia jatrophæ, Lycæna cassius, Callidryas eubele, Krico-gonia lyside, Phœbis agarithe, Aphrissa statira, Pontia monuste, Papilio polydamas, Eudamus proteus.*

Large Saturniidæ were absent, but Sphingidæ were abundant and easily caught on the scarlet flowers of the Royal Poinciana, *Protoparce brontes* and *Enyo lugubris* were examples. The large noctuid, *Erebus odora,* was common, resting during the day on the sides of cliffs or walls, in caves and palm thickets, and fluttering bat-like about the lights at night. *Utetheisa bella* was conspicuous but showed little variation.

A considerable number of Coleoptera were obtained, for the most part, very like those of south Florida, but with some mixture of West Indian forms. Three species of Cicindelidæ were included but the greater number were Cerambycidæ, Scarabæidæ, Chrysomelidæ and Rhynchophora. Carabidæ were scarce, the lack of soil except in banana holes, fresh water streams, lakes and perhaps the abundance of lizards, making unfavorable conditions for ground beetles.

Hymenoptera were numerous on flowers, those of the Bougainvillea vine being conspicuous and were secured in part through the aid of a colored boy whose picture was shown.

In Diptera the housefly was a nuisance at Nassau, two species of Tabanidæ proved troublesome on the water, and the mosquitos, everywhere abundant, drove the party out to sea by their numbers on Andros Island.

Blattidæ made up a large part of the catch in Orthoptera, the season, May and June, being too early for Acridiidæ, Mantidæ, etc., to have passed beyond the nymphal stage. Two species of *Conocephalus* were taken and another heard.

In Hemiptera, several species of Lygæidæ were found on the silk cotton trees, which are common on the islands, though said that all come from one planted tree. A species of *Gerris* and a *Corixa* were often found in the native wells, which though brackish and liable to contain insects and Batrachians, are not unwholesome. One species of *Cicada,* locally called

singer, was obtained, and a curious bug was found in the caves among bats. The bottom of the caves was in many places covered with bat guano.

Four species of Odonata were collected and others were seen; three small species of Myrmeleonidæ and a great abundance of Termites. Their nests were encountered everywhere, rising like huts from the ground, or forming large balls on trunks and branches of trees, no doubt accounting for the small amount of dead wood.

Mr. Engelhardt mentioned the following works on the Entomology of the Bahamas as useful, viz.:

Emily Mary Sharpe, Proc. Zool. Soc. Lond., 1900, butterflies, 29 species.

Geo. F. Hampson, Ann. Mag. Nat. Hist., VII and XIV, moths, 200–300 species.

Chas. W. Johnson, Psyche, XV, 90 sp. Diptera.

T. Horner Coffin, Rep. Balto. Geog. Soc., 15 sp. mosquitos.

W. L. Distant, Ent. Mag., XII, *Cicada bonhote.*

Albert P. Morse, Psyche, XII, Orthoptera.

Jas. A. G. Rehm, Bull. Am. Mus. Nat. Hist., XXII, 34 sp. orthoptera.

H. F. Wickham, Rep. Bahama Exp. State Univ. Iowa; Coleoptera.

Professor Wheeler's paper on ants, Bull. Am. Mus. Nat. Hist., XXI, and Mrs. Northrop's on the plants were mentioned in the discussion following Mr. Engelhardt's remarks, in which President Osburn and Messrs. Davis and Leng took part. It developed that in birds and otherwise there was a marked tendency for each island to support its own species.

Mr. Mutchler showed a specimen of the beetle *Microphthalmus debilis,* donated by Mr. H. S. Barber, of Washington, and read extracts from the paper by Mr. Barber, descriptive of its plastic larval forms and manifold reproductive habits.

Mr. Leng showed Miss Marian A. Palmer's paper on "Life History of Ladybeetles" in the current number of the Annals of the Entomological Society of America.

Mr. Wintersteiner called attention to Champion's paper in Trans. Ent. Soc. London, 1914, part 1, on Malachidæ and Melyridæ, in which Floridian and West Indian forms are mentioned.

MEETING OF JANUARY 5, 1915.

The annual meeting of the New York Entomological Society was held at the American Museum of Natural History, on Tuesday, January 5, 1915, at 8:15 P. M. President Dr. Raymond C. Osburn in the chair, with seventeen members present, as a visitor, Mr. W. T. Bather, of the Brooklyn Entomological Society.

In the absence of the Secretary, Mr. Barber was chosen to act as secretary pro tem.

Mr. Sherman spoke of receiving sample blocks or cubes of granite by parcel post from Massachusetts with the gypsy moth inspector's name on the seal, thus showing what precautions are now being taken to prevent the spread of the gypsy moth.

Mr. Dow read a paper under the title "Fragmenta Archaica et Achaica," being extracts from "A History of Insect Observation in all Ages," of which he has furnished the following abstract: "The first was the 'Insects of the Avesta,' to which a date, 6300 B. C., is ascribed by Aristotle. The fourth thing in order of creation by the Dæmon was the wasp, sure death to cattle and fields. The others were the locust, scorpion, flies, lice and two kinds of ants. In classic Persian a tribe of Derbices is mentioned, the word meaning wasps. This throws light on the Egyptian belief that wasps' stings were fatal to cattle, and the Greek belief that human life was unsupportable north of the Black Sea on account of the great number of wasps.

Then followed an argument that the honey bee was domesticated by the Turanian long before it was known to the Iranian races, the parents of present Europeans. It was conceded prior to the Christian Era by the Egyptian scholars that the Turanian races of Scythia and Phrygia were older than themselves. The term "sweeter than honey" occurs in the first Lama of the Kalmuck, dating 80,000 years after the birth of the human race and at the time of an event comparable with the expulsion from the Garden of Eden. In subsequent discussion Dr. W. T. Forbes brought out the very important point that the medieval word "mead" is the same as the Greek "methu" or "methe," usually translated as wine but really meaning a solution of honey and water and subjected to alcoholic fermentation. Compare the present word "methyl" alcohol. This proves that although no common word for honey bee existed, the honey drink was known before the Greeks separated from the German and English peoples.

Under the subtitle of "The Sweet Singers of Pallas Athen" there was presented the classical history of the mistranslated Tettix, the Cicada; Acris, the grasshopper and Attelabus, the Cricket, the singer of sorrow. The Tettix was the sweet singer of the Gods, placed in the constellations, devoted to two great gods, bloodless, painless, eating nothing except the dew, but itself eaten in larval form by the Athenians. They were the autochthones of Attica, before the arrival of the human race. The Acris is the voracious grasshopper, which served John the Baptist for food and was eaten generally by the Greeks. They originated from a mortal who was presented with immortalty but not perpetual youth, and the word is equivalent to the spindle shanks of the old man.

Various medical formulæ, dating prior to 300 B. C., were given, including pulverized tettix and bed bugs.

From the Sanscrit, possibly not later than 6000 B. C., there was described the annual festive day devoted to the flies, which were fed on flour and sweet stuff. Believers in the Sanscrit religion were forbidden to kill even the fleas and bed bugs.

Mr. Dow was asked about the kind of Orthoptera which the ancients kept in cages, and he said he presumed they were either crickets or true grasshoppers.

Mr. Bather, who has traveled in Portugal, spoke of the popularity of its

crickets, not only because of their singing quality which surpassed our native species, but also because they were supposed to bring good luck. He had seen people buying these insects in the markets, often keeping them in specially prepared cages for the purpose.

The president, Dr. Osburn, read a paper on the "Relation of Insects to other Animals," particularly to the Arthropods. Reference was made particularly to the segmentation, appendages, nervous system and circulatory system. The homologies in the different types were pointed out and diagrams representng the subject were placed upon the blackboard.

Professor Crosby referring to the statements made by J. Henri Fabre, that wasps in stinging their victims to paralyze them, always selected the position of their nervous ganglia, particularly of the head, for their deadly thrust, asked whether this was true. The question was discussed by Messrs. Schaeffer, Forbes, Dow and Barber. The opinion was generally expressed that it was not so much the exact location of the ganglia as the weak point in the armor of the insect which was selected; the ganglion above the oesophagus being located close beneath the connection between the head and thorax, where a softer tissue rendered easy the penetration of the sting.

MEETING OF JANUARY 19, 1915.

A regular meeting of the New York Entomological Society was held January 19, 1915, at 8:15 P. M., in the American Museum of Natural History, President Dr. Raymond C. Osburn in the chair, with 16 members present.

Mr. Dow reported receipt of letter from Dr. Walther Horn, in which the safety of the Wytsman plant in Belgium was stated.

Mr. Davis exhibited a copy of "The Aurelian or Natural History of English Insects" by Moses Harris, published in 1766, a large quarto with plates engraved and hand-colored by the author. Mr. Davis read several extracts referring to the title derived from a society called the Aurelians, which met when Moses Harris was a boy of 12 in the Swan Tavern in Change Alley, until the building and their collection of insects was destroyed by the fire in Cornhill; also to the style of net used, and the method of killing by pinching and thereafter stretching the specimens in the field, from which he said the English practice of setting the insects low on the pins was doubtless derived. Several passages of quaint phraseology were read, in one of which the females were designated as hens and the males as cocks.

Mr. Dow added that Moses Harris lived to see and figure in part, the collection of 11,000 specimens accumulated by Drury.

Mr. Davis, under the title "Remarks upon Some Insects Collected in the Catskills" spoke of his visit in August to Intervale, the summer home of Senator Howard R. Bayne, near East Jewett, N. Y., situated in a valley running east and west in the northern part of the Catskills Mountains. The insects shown were mostly collected in this valley and at an elevation of about 2,000 feet; the mountains surrounding the valley reach an ele-

vation of 3,900 feet, but were not visited on account of ill health at the time. Mr. Davis said it was somewhat remarkable that though he was not able to work as hard as he did in the Adirondacks, and caught fewer insects, he had already discovered among them a new species of *Atlanticus* and suspected more in other orders. He noticed that *Cicindela harrisi* replaced *C. sexguttata* completely, that *Satyrus alope* exhibited a greater range of variation than on Staten Island, and in many other respects besides those pointed out in the Orthoptera, the locality seemed possessed of a fauna more or less marked by peculiarities that deserve further study.

Mr. Dow read a paper "Fragments of Entomological History" in which he traced the entomological references in the earliest literature of the old world down to 323 B. C., when Aristotle mentioned 74 kinds of insects, including spiders, and pointed out that the first references cover mainly crop destroying and biting insects, although the honey bee and silkworm also receive early mention.

A few of the generic names now in use can be traced back to these early times, though the meaning has usually become perverted.

Mr. Watson read a paper "Some Local Lepidopterous Records" which will be printed in the JOURNAL under Miscellaneous Notes.

MEETING OF FEBRUARY 2, 1915.

A regular meeting of the New York Entomological Society was held February 2, 1915, at 8:15 A. M., in the American Museum of Natural History, President Dr. Raymond C. Osburn in the chair, and nine members present.

Dr. J. B. Knapp, of 35 West 75th St., was elected an active member.

The President called attention to a work recently issued by Comstock Publ. Co., "Handbook of Medical Entomology," by Drs. Riley and Johannsen, of Cornell University.

Mr. Bird under the title "A *Papaipema* of Metropolitan Environment" told the story of his discovery of *P. humuli*, which has been described in the Canadian Entomologist, and exhibited twelve specimens of the moth, with its pupa, larva in five stages of development, and samples of workings in the swollen stem of the hop vines. In the course of his remarks, Mr. Bird pointed out the difficulties the similarity between this and allied species, particularly *P. circumlucens* Smith, had caused previous authors, and the method he had followed of raising the specimens of both species so that all stages and food plant became known. In connection with the hop, the food plant of *P. humuli*, which by botanists has sometimes been regarded as an introduced species, though that view is discarded in the last edition of Britton & Brown, Mr. Bird said that he had found on a hop vine (*Humulus lupulus*) near his home fourteen species of insects, one a Cecidomyid, *Lasioptera humulicaulis*, the possibility of whose having an alternative food plant is exceedingly remote, two others of genera restricted to North America

alone, besides the *Papaipema,* which also belongs to a genus wholly North American and renowned for the discriminating manner in which its species select differing, indigenous food plants. So that the evidence of these insects is strongly in favor of the indigenous character of the food plant, for it has no near relative in the American flora, on which the insects could have subsisted prior to the time of the suspected introduction.

Mr. Leng exhibited and discussed briefly "Carabidæ collected in Northern Forida by Messrs. Mutchler and Watson," pointing out that *Cicindela nigrior, C. tranquebarica var: vulgaris minor,* and *Platynus æruginosa,* contained in the lot, were not previously known to occur in the State.

In reply to Dr. Lutz, he added that the fauna of the northern part of the state did not otherwise differ strongly in Carabidæ from the southern part.

Dr. Osburn read a paper "Notes on Species of *Eristalis*" in which he showed that the European *E. arbustorum,* probably confused heretofore by American workers with *E. meigenii,* is especially abundant near New York City, and occurs as far east as Labrador and as far west as Ohio. From the absence of specimens in the older collections examined he thought its introduction must be quite recent. The differences between this species and *meigenii* were shown by drawings of both sexes and by a long series of specimens. He also exhibited *E. rupium* Fab., another species new to North America, which had been taken at Atlin, B. C., by Mr. E. M. Anderson, of the Provincial Museum, Victoria, B. C., the past summer, and *E. latifrons* Loew, common in the western states and recently (July 15, 1908) taken at Jamaica, L. I., by Mr. Engelhardt, and at Snake Hill, N. J.

In the discussion that followed between Dr. Osburn and Messrs. Bird, Davis, Comstock and Leng, it was brought out that the separation of species by obvious color characters was frequently confirmed, if valid, by the study of more obscure parts, especially the genitalia, but that care was necessary to avoid deceptive results from faulty preparation of material of an insufficient number of examples.

Mr. Comstock mentioned the projected collecting trip to Parry Sound, of Mr. H. S. Parish, at present in Toronto, No. 81 Robert St., and advised those interested in obtaining material from that region to communicate with him.

Mr. Davis exhibited a new Cicada from California, to be called *Okanagara rubrovenosa.*

THE NEW YORK ENTOMOLOGICAL SOCIETY.

Organized June 29, 1892.—Incorporated June 7, 1893.

The meetings of the Society are held on the first and third Tuesday of each month (except June, July, August and September) at 8 P. M., in the AMERICAN MUSEUM OF NATURAL HISTORY, 77th Street and Eighth Ave.

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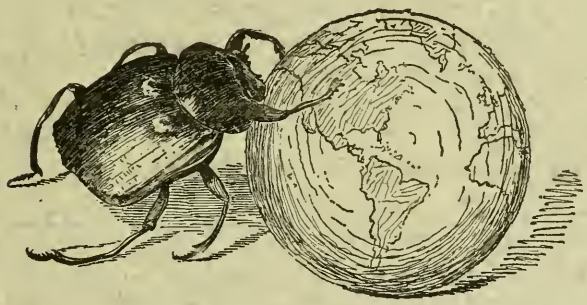

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A FEW MEMORIES.

By Annie Trumbull Slosson,

New York.

It seems to me such a little while since I was a novice in entomology, just a very ignorant beginner, that it was almost a shock when somebody suggested the other day that some of my recollections of our old entomologists might interest people. For I was no longer young when I took up the study of insects. I had always, from childhood, been fond of nature and for years devoted myself to botany, being so fortunate as to make some rather interesting discoveries and being a correspondent of Prof. Asa Gray and other old-time plant students. But it was not until the early spring of 1886 that I turned my attention to the study of insects. I little knew what I was doing! I meant to secure a superficial, cursory acquaintance with the more common "bugs," particularly those which infested my plants and flowers. I picked up an elementary work—by Prof. Packard, I think—intended to start school children in the study of entomology and began looking it over. There were a few illustrations of familiar insects. It was then early in March and a backward season. So where could I find specimens to compare with my pictures? I sat near an open wood fire one day in my old Connecticut home reading the little book and as I reached for a stick of hickory to brighten the fire I saw something moving on the surface of the wood. It was a "bug" and alive, my very first entomological

specimen. And it was pictured in my book! For turning the pages I found the creature's likeness, the slender form, long feelers, velvety black wings—I had never heard of elytra—marked curiously with golden yellow, part of the markings seeming to form a W just as the book said. I found that its high sounding name was *Cyllene pictus*. That was the very first scientific insect-name I ever learned. But the habit was formed. You know what an insidious, enthralling, captivating habit it is. Victims to cocaine and morphia have been known to break their fetters; even dipsomaniacs have escaped from slavery and rejoiced in glad and sober freedom. Did an entomologist ever burst his chains? What are drugs to bugs! This beginning of mine, you see, was not quite thirty years ago. So, though aged in years I am not so very old an entomologist. But I knew well some of those we call pioneers in the study and have many delightful memories associated with them. My first acquaintance, helper, and adviser in my new pursuit was Henry Edwards and to him I owe more than I can say. I had often seen him on the stage, an excellent actor, but had never met him personally. Desiring to know the names of some butterflies and moths from my White Mountain summer home I ventured to ask his aid. I shall never forget his cordial reception of my request, his warm invitation to his home on 116th Street and the courtesy with which he welcomed me there and examined my specimens. The appearance of these must have distressed him, for they were pinned with large pins—not insect pins, of which I knew nothing—in a pasteboard box and lay flat upon the surface of the board with no intervening space and no cork. But he showed no sign of disapproval, spoke almost enthusiastically of the interest and rarity of certain specimens and urged my going on with my collecting. That was the beginning of a close and pleasant friendship which continued till his death—in 1891.

He was a delightful man, a fluent and interesting talker, and full of enthusiasm. His experience as an actor had given him a habit of gesticulation and imitativeness and as he told of the capture of some rare or desirable species he captured it anew before your very eyes and, like the poet's old soldier "shouldered his crutch" (or net) "and showed how fields were won." I can see his somewhat portly figure this minute, as I write, dashing about the room, a wholly imaginary—though quite visible to me—butterfly net uplifted and his eager

eye fixed upon some point on the wall not far below the ceiling as he described graphically his capture of some Australian lepidopter. When, after herculean efforts, the fight was over and the victory his, he—and I too—felt somewhat spent and he would mop his moist brow and sigh out, "Oh, it was glorious, a splendid specimen, new to science, I'm sure." He was just as satisfactorily enthusiastic over a friend's capture as of his own. In the first lot of lepidoptera I sent him from Florida there was a specimen of *Sphinx cupressi*, the only one I ever captured, and he warmed my heart by dwelling on its rarity and my wonderful luck. When I spoke in my letters of field experiences he wrote at once in return urging me to print them and when I rather timorously ventured to express an opinion as to what I thought might be a new variety or species he begged me to be bold and claim discovery at once. In a letter of December, 1887, he urges my describing the Ecpantheria I had spoken of in my letters as having partially denuded wings and, a little later, approves my printed description and my choice of name,—*E. denudata*. A few months earlier he had written concerning a small moth I had taken in Florida that it belonged to a new genus which he should call *Inguromorpha* and that the specific name was to be *slossonii!* I remember distinctly the delighted, almost unbelieving, amaze with which I read that letter. Without a thought of irreverence I felt like expressing my willingness to "depart in peace" now that I had seen this greatest of all earthly honors descend upon my humble head. An insect named for unworthy me! And the name was so sonorous and delightful in sound. *Inguromorpha slossonii!* Like the proverbial "Mesopotamia" of the eloquent preacher it stirred one's soul and I think I murmured it even in my sleep. That it died a natural—very natural!—death a little later and sank into the dread valley of synonymy has never dimmed the brightness and glory of that wonderful christening and my very first entomological namesake. Mr. Edwards was much interested in my re-discovery of *Scirarctia echo* in Ormond and what I learned of the destructiveness of its larva, called there locally, the "army worm." The species had been considered quite rare up to that time. I sent him two of the showy larvæ which he raised and afterwards described in their different stages of development. His letters at that time show his great interest in the matter.

"The two little fellows are very healthy and eating away at a

terrible rate. I am most anxious to see what the cocoon will be," he writes in April, '89, and a week later says—"One of the larvæ has spun a thin cocoon in a lettuce leaf and is quietly undergoing his change; the other looks as if it were preparing." In June he tells of the emergence of the moths, one a female which laid ten ggs before her death, "I only wish," he says, "that they could have been hatched and that I could have raised a brood. I hope you may be more successful." When I wrote in that same year of taking at Franconia a moth which I suspected might be Walker's *Phragmatobia assimilans* and asked if he had seen the type in British Museum he wrote, "Walker's species is at present quite unknown to me." But the next day he corrected this statement saying, "I find in my note book on British Museum collection with regard to this species. 'Looks like a large specimen of *rubricosa,* but one example has no spots.' So you see I did examine it but my memory did not serve me yesterday." Soon after this I sent him a specimen of a *Spilosoma* which seemed unfamiliar and his letter of acknowledgment says, "I am puzzled—as I am indeed about the whole genus. It sadly wants examination and, for this purpose, a large number of examples from various localities should be carefully noted. I am not yet certain what *congrua* is. I am sure it is not *niobe* or *antigone.* At present I agree with you that your species is new." This is the species I afterwards described as *prima.* I sent him the manuscript of my description and he wrote, approving and saying, "The only suggestion I can make is that you should emphasize more strongly the difference in the color of coxæ and tibiæ. In *prima* they are dark smoky, in *congrua, antigone,* and *virginica* they are bright orange. This seems to me the best character for the separation of your new species." Mr. Edwards did not live to read, perhaps engage in, the warm discussion on this very subject, *Spilosoma congrua* and its allies, carried on for several months by Messrs. Fyle, Smith, Dyar and Lyman in Canadian Entomologist (Vols. XXXI and XXXII). Mr. Lyman styled the matter an "Entomological muddle" and it only ended when Dr. Bethune assumed the black cap and sentenced the enthusiastic debaters to silence with the fateful words "This controversy is now closed as far as the pages of this magazine are concerned." I am happy to say that my own poor little species was allowed to retain the name I had given it.

In 1884 (Papilio IV) Mr. Neumorgen had described a Florida moth as *Varina ornata* and placed it provisionally in the Cochlidiinæ. Later Prof. Smith assigned it to the Liparidæ. The species was not rare in West Florida and I took a number of specimens. The life history was unknown and the species had been described from the male only. So I was delighting on taking a fine female at light and securing a few eggs. From these emerged some curious little larvæ which to my surprise bore no resemblance to larvæ of the groups in which the moth had been placed. They were semi-loopers as are the newly hatched larvæ of many noctuids. Not knowing their food plant, and my efforts to find something they would eat proving useless the little fellows died at a very early age. But Mr. Edwards was much interested in my small discovery, writing enthusiastic letters and suggesting plants which the larvæ might possibly eat, hints which came too late to be of use. Prof. Packard to whom I also wrote expressed much interest in the matter and later, wrote an article on the position of the moth, quoting from my account of the larvæ (Can. Entom., XXV). *Varina ornata* was found to be a synonym of *Acherdoa ferraria,* Walk., and in late lists is placed with the Noctuidæ. I afterwards described the female.

Though strong and even robust in appearance, Mr. Edwards was liable to attacks of serious illness and probably had some chronic disabilities. Any unusual excitement, agitation, mental fatigue or worry would bring on such attacks. In April, 1888, he writes.—"I have had a dreadful time. The terrible blizzard of March 12th gave me a great shake and I have not been myself since." But he adds—"I am hard at work on my catalogue of transformations." In March, 1891, he writes of having been very ill with pneumonia "four weeks in bed, the doctor with me three times a day. I am only now able to sit up and wander about my bedroom. I have not been in my butterfly room for seven weeks!" He worked hard at his profession as an actor, often writing me when rehearsing for a new play that he had scarcely left the theatre for days and was "dead tired." His fellow actors made all manner of sport of his entomological hobby and played many jokes upon him. He told me of some of these and seemed to take them very good naturedly. Once in the midst of an exciting scene in melodrama when he himself was pouring forth an impassioned speech he suddenly caught sight of a large insect hover-

ing in the air near him. He tried to forget it and to go on with his histrionic eloquence, but in spite of himself he would keep his eye upon the singular creature. For it was unlike anything he had ever seen, even in Australia, and whether lepidopterous, coleopterous, hymenopterous or what he could not guess. "I own," he said, "I lost my head and then my lines and in another second should have left the stage, abandoned the waiting heroine and flown for my net when the thing disappeared." It had been manufactured by some frivolous friends and suspended by invisible wire from above as a practical joke." He added, with his whimsical smile, "Don't I wish it had been real? New species, new genus, new order! Heavens!"

In August, 1889 (I have not arranged my quotations according to dates for these are only random and scattered reminiscences), he wrote that he was to start for Australia in a few days with his theatrical company to remain until the next spring. He had been somewhat embarrassed in financial matters for some time and was making strong efforts to sell his entomological collection. Our museum here had talked of purchasing it but there were annoying delays and these worried and irritated him. Up to the very last day before his departure he hoped the sale would be carried through, but it failed of completion. So the enthusiasm which the thought of collecting in that country of marvels would have otherwise evoked was absent as he wrote or talked. He wrote from Melbourne, Sydney and other places of the intense heat,—"thermometer since Christmas generally about 100 degrees in the shade, the warmest season for thirty years. It has quite unnerved me and I have had no heart even for collecting. The place I am now in"—near Sidney—"is a splendid field and as the weather has moderated a little I hope to do something during the five weeks' stay. I think I shall take home at least 10,000 specimens in all orders." Later he writes, "I have been offered an appointment here under Government but it will not be open until after close of present year. If I do not settle with Mr. Jessup as to sale of my collection I shall return to Australia, bringing all my belongings and end my days in this far off land." At the close of this letter, so filled with the tropical heat, the flora and fauna of this distant clime, it is odd to meet with the mention of one of our little eastern species. "I forgot to tell you that I took one specimen of your *Euphaneessa meridiana* last summer at Plainfield, N. J."

Mr. Edwards returned in August, 1890, bringing wonderful treasures which I saw when I came home from the mountains in October. He never seemed very strong after this, was often ill and frequently depressed mentally. But he kept up his work at the theatre through the winter of 1890–'91 and in the early spring. But in April, 1891, while with his company in Baltimore he broke down utterly, gave up and came home. His last letter to me was written on May 3, 1891, and is a very sad one. He writes of his decision to leave the stage for the time, saying, "I have talked the matter over with Mr. Daly" (his manager) "who was very kind and thoughtful and we both thought it best that I should stop acting and get a ong rest. I feel in fact almost a broken man and am really powerless to do anything. I shall go away to the country next week and hope the change will do me good. Even the thought of entomology does not rouse me as it used to do. All my energy and strength seem gone." And again, "I regret I could not see you before you went away, but I can scarcely crawl about, my limbs are so weary." I received this letter in Franconia and, of course, answered it at once. While waiting and hoping for better tidings the news came to me of his death in New York on June 9.

Our entomological journals of that time all had full notices of his life and work. I, myself, have written here only of my own personal relations with this kindly, courteous, warm-hearted, generous man, my valued friend.

LIST OF THE ORTHOPTERA COLLECTED IN NORTHERN FLORIDA IN 1914 FOR THE AMERICAN MUSEUM OF NATURAL HISTORY, WITH DESCRIPTIONS OF NEW SPECIES.

BY WM. T. DAVIS,

NEW BRIGHTON, STATEN ISLAND, N. Y.

In the fall of 1914 Mr. Andrew Mutchler and Mr. Frank E. Watson, of the staff of the American Museum of National History, visited Florida on a collecting trip for that institution, and spent a few days

each at Gainesville, Monticello, De Funiak Springs, Crestview and Pensacola. While they were mainly interested in Coleoptera and Lepidoptera they nevertheless collected a considerable number of species of Orthoptera, which have, through the courtesy of Dr. Frank E. Lutz, been placed in my hands for identification. To Mr. Mutchler, Mr. Watson and Dr. Lutz, I am under obligations for the opportunity thus afforded of examining an interesting collection.

The several species of short winged *Melanoplus* and the interesting *Diapheromera* were submitted to Messrs. Rehn and Hebard of the Academy of Natural Sciences of Philadelphia, who kindly spent much time in their consideration.

In addition to the records of the American Museum specimens, I have added two from a small collection received through the kindness of Mr. J. R. Watson, entomologist of the Agricultural Experiment Station at Gainesville, Fla.

Notwithstanding his illness, my friend, Mr. Louis H. Joutel, has been good enough to make for me excellent sketches of the supra-anal plates and of the cerci of the two new species, so that there ought to be no trouble in identifying them in the future.

BLATTIDÆ.

Ischnoptera nigricollis Walker.
Crestview, Oct. 15–16, 1 female.

Ischnoptera uhleriana fulvescens S. and Z.
Gainesville, Sept. 26–Oct. 2, 1 female.

Ceratinoptera diaphana Fabr.
Gainesville, Sept. 26–Oct. 2, 1 female.

Eurycotis floridana Walker.
Pensacola, Oct. 11–14, 1 female, 3 nymphs.

Blattella germanica Linn.
Gainesville, Sept. 26–Oct. 2, 2 males, 2 females.

Periplaneta brunnea Burm.
Gainesville, Sept. 26–Oct. 2, 2 males.

MANTIDÆ.

Stagmomantis carolina Johannson.
Gainesville, Sept. 26–Oct. 2, 1 female, 2 nymphs; Monticello, Oct. 4–8, 1 male; Pensacola, Oct. 11–14, 2 females.

PHASMIDÆ.

Diapheromera femorata Say.

Monticello, Oct. 4–8, 1 male. This is a very interesting insect and is the first *Diapheromera* to be reported from Florida. It, however, certainly belongs to that genus as it has a spine near the apical tip of each of the hind femora. It is identified as *femorata* with much doubt. The fore and hind femora are proportionately longer than is usual in that species; the middle femora are not much swollen; are smoother than in typical *femorata,* and are without the usual cross-bands, being of a uniform brown. The cerci are about as in *femorata.* The length of the body is about that of the average *femorata.*

Manomera tenuescens Scudd.

Gainesville, Sept. 26–Oct. 2, 1 female.

Anisomorpha buprestoides Stoll.

Gainesville, Sept. 26–Oct. 2, 1 male, 1 female; Pensacola, Oct. 11–14, 3 males, 3 females.

ACRIDIDÆ.

Neotettix femoratus Scudd.

Gainesville, Sept. 26–Oct. 2, 1 male; Crestview, Oct. 15–16, 1 male.

Neotettix bolteri Hancock.

Gainesville, Sept. 26–Oct. 2, 1 male; Monticello, Oct. 4–8, 1 male.

Paxilla obesa Scudd.

Gainesville, Sept. 26–Oct. 2, 1 female.

Tettigidea lateralis lateralis Say.

Gainesville, Sept. 26–Oct. 2, 1 male, 3 females; Monticello, Oct. 4–8; 4 males, 3 females; Crestview, Oct. 15–16, 1 female.

Tettigidea armata Morse.

Monticello, Oct. 4–8, 2 females.

Radinotatum brevipenne Thomas.

Gainesville, Sept. 26–Oct. 2, 12 nymphs; Monticello, Oct. 4–8, 2 nymphs.

Truxalis brevicornis Linn.

Monticello, Oct. 4–8, 1 female.

Mermiria alacris Scudd.

Gainesville, Sept. 26–Oct. 2, 1 female; De Funiak Springs, Oct. 17–19, 14 males, 1 female.

Syrbula admirabilis Uhler.

Gainesville, Sept. 26–Oct. 2, 2 females; De Funiak Springs, Oct. 17–19, 7 males.

Amblytropidia occidentalis Sauss.

De Funiak Springs, Oct. 17–19, 1 male, 1 female; Crestview, Oct. 15–16, 1 male, 1 nymph.

Orphulella pelidna Burm.

Gainesville, Sept. 26–Oct. 2, 7 males, 11 females; Monticello, Oct. 4–8, 4 males, 2 females; De Funiak Springs, Oct. 17–19, 9 males, 2 females; Crestview, Oct. 15–16, 1 female; Pensacola, Oct. 11–14, 1 male, 5 females.

Dichromorpha viridis Scudd.

Gainesville, Sept. 26–Oct. 2, 5 males, 4 females; Monticello, Oct. 4–8, 3 males, 3 females.

Clinocephalus elegans Morse.

Gainesville, Sept. 26–Oct. 2, 2 males; Pensacola, Oct. 11–14, 1 male, 2 females.

Arphia xanthoptera Burm.

Gainesville, Sept. 26–Oct. 2, 1 male; De Funiak Springs, Oct. 17–19, 1 female, 2 males.

Arphia granulata Sauss.

Gainesville, Sept. 26–Oct. 2, 1 female.

Chortophaga australior R. & H.

Gainesville, Sept. 26–Oct. 2, 4 males, 2 females; Monticello, Oct. 4–8, 1 female; Pensacola, Oct. 11–14, 1 female.

Hippiscus rugosus Scudd.

De Funiak Springs, Oct. 17–19, 2 males, 2 females.

Dissosteira carolina Linn.

Gainesville, Agri. Experiment Station, June 26, 1912, 1 male, J. R. Watson, collector.

Spharagemon crepitans Sauss.

Gainesville, Agri. Experiment Station, 1 male, J. R. Watson, collector.

Spharagemon collare wyominganum Thomas.

Gainesville, Sept. 26–Oct. 2, 2 females.

Scirtetica marmorata picta Scudd.

Gainesville, Sept. 26–Oct. 2, 1 male, 1 female; De Funiak Springs, Oct. 17–19, 4 males, 2 females; Pensacola, Oct. 11–14, 1 male, 1 female.

Psinidia fenestralis Serv.

Gainesville, Sept. 26–Oct. 2, 4 males, 1 female; De Funiak Springs, Oct. 17–19, 5 males, 1 female; Crestview, Oct. 15–16, 1 female; Pensacola, Oct. 11–14, 1 male, 1 female.

Trimerotropis citrina Scudd.

De Funiak Springs, Oct. 17–19, 2 males, 3 females; Crestview, Oct. 15–16, 1 male, 1 female; Pensacola, Oct. 11–14, 3 males, 4 females.

Romalea microptera Beauv.

Gainesville, Sept. 26–Oct. 2, 3 males, approaching var. *marci* in color.

Leptysma marginicollis Serv.

Gainesville, Sept. 26–Oct. 2, 2 nymphs; Pensacola, Oct. 11–14, 1 nymph.

Schistocerca americana Drury.

Gainesville, Sept. 26–Oct. 2, 5 females; De Funiak Springs, Oct. 17–19, 2 males, 2 females; Pensacola, Oct. 11–14, 1 male.

Schistocerca alutacea Harris.

De Funiak Springs, Oct. 17–19, 7 males.

Schistocerca obscura Fab.

Gainesville, Sept. 26–Oct. 2, 2 males, 2 females.

Schistocerca damnifica calidor R. & H.

Gainesville, Sept. 26–Oct. 2, 5 females; Monticello, Oct. 4–8, 1 male; De Funiak Springs, Oct. 17–19, 2 males, 1 female.

Gymnoscirtetes pusillus Scudd.

Gainesville, Sept. 26–Oct. 2, 1 male, 2 females.

Hesperotettix floridensis Morse.

De Funiak Springs, Oct. 17–19, 1 male, 1 female.

Melanoplus rotundipennis Scudd.

Gainesville, Sept. 26–Oct. 2, 3 males, 1 female.

Melanoplus pygmæus new species.

Related to *M. rotundipennis* but differing in the distinctly broader and more truncate prosternal spine in both sexes, which is broader than long, and in the distinctive male genitalia.

TYPE: Male; De Funiak Springs, Florida. October 17–19, 1914. (Mutchler and Watson.) [American Museum of Natural History Collection.]

Size a little smaller than usual in *rotundipennis* and form slightly more slender, with dorsum of pronotum having the lateral carinæ more diverging toward the posterior margin than in that species. Head with eyes less protuberant than in *rotundipennis* and with frontal costa distinctly sulcate throughout. Tegmina much as in that species and separated by a width of 1.2 mm. Extremety of abdomen similarly little produced but with apex of similarly proportioned subgenital plate produced in a brief rounded knob; supra-anal plate very simple as in *rotundipennis* but more elongate, distinctly longer than broad, furcula absent; cerci of the *rotundipennis* type (see figure) but with a greater curve of the shaft beyond the middle and with the apex distinctly larger and more evenly rounded. The soft integument between the supra-anal and subgenital plates does not rise above the dorsal margin of the subgenital plate.

Allotype: female; bears the same date as the type.

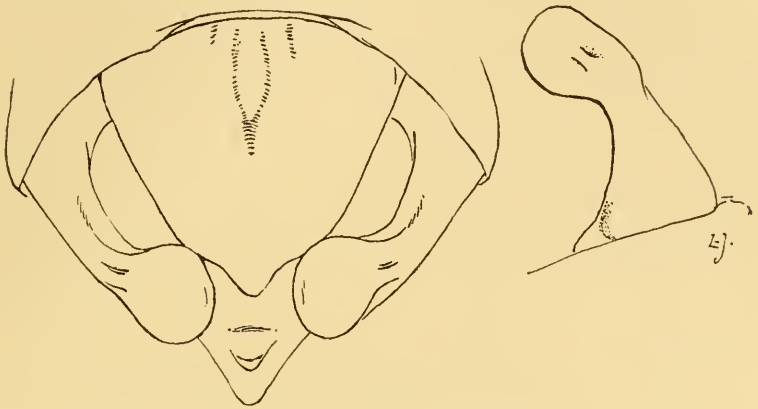
This sex may be separated from females of *rotundipennis* by the characters of the prosternal spine and lateral carinae of the dorsum of the pronotum. The general coloration and coloration of the caudal tibiae may also serve to distinguish this sex, which is very similar to females of *rotundipennis* in size, form and general superficial appearance.

MEASUREMENTS (in millimeters).

	Male Type.	Female Allotype.
Length of body	14.	23.
Length of pronotum	3.3	4.8
Length of tegmen	2.8	4.
Greatest width of tegmen	1.8	2.6
Length of caudal femur	9.7	12.7
Greatest width of same	2.3	3.2

In coloration the specimens resemble less heavily marked specimens of *rotundipennis* with caudal femora nearly immaculate above and pale yellow in the male and weakly orange in the female beneath. The caudal tibiæ are very pale bluish with a slight purple suffusion. In the male the eyes and antennæ are distinctly reddish. The lateral lobes of the pronotum are almost immaculate in the female.

These specimens of *Melanoplus pygmæus* have been carefully compared by Mr. Morgan Hebard with the considerable series of



allied species in his collection, and I am indebted to him for pointing out the chief differences between it and *rotundipennis*.

Melanoplus scudderi Uhler.

Monticello, Oct. 4–8, 1 male.

Melanoplus propinquus Scudd.

Gainesville, Sept. 26–Oct. 2, 6 males 4 females.

Melanoplus keeleri Thomas.

Gainesville, Sept. 26–Oct. 2, 1 male, 2 females; De Funiak Springs, Oct. 17–19, 2 males, 2 females; Crestview, Oct. 15–16, 2 males, 1 female; Pensacola, Oct. 11–14, 1 female.

Paroxya atlantica Scudd.

Gainesville, Sept. 26–Oct. 2, 1 male, 1 female; Monticello, Oct. 4–8, 2 males, 4 females; Pensacola, Oct. 11–14, 1 female.

Paroxya floridiana Thomas.

Monticello, Oct. 4–8, 2 females.

Aptenopedes sphenarioides Scudd.

Gainesville, Sept. 26–Oct. 2, 2 males, 3 females; Monticello, Oct. 4–8, 1 male, 4 females.

Aptenopedes rufovittata was described by Scudder in 1877, in the same paper with *Aptenopedes sphenarioides* and *Aptenopedes aptera*,

from four males and three females collected at Ft. Reed, Florida, by Mr. J. H. Comstock in April, 1876. As this species has not been recognized by recent collectors, the two females collected April 21, 1876, and one male collected April 10, 1876, each marked "Type specimen," and now in the collection of Cornell University, were recently examined with much interest. The females are nymphs of *A. sphenarioides* and have small wing-pads, while the male is a small specimen of *A. aptera*. This last is in good condition except that the antennæ are gone. It has no sign of wing-pads and has the proportionately larger head of *aptera* as compared with *sphenarioides*. Also like *aptera* it has the hind tibiæ bluish and the tarsi bright pink in color. In the Scudder collection at Cambridge, Mass., there is a single "type" specimen of *A. rufovittata* from Ft. Reed, Fla., April 20, 1876. It is a female nymph of *A. sphenarioides*.

As *A. aptera* was described from but one female, it was a simple matter from insufficiency of material to overlook the male.

TETTIGONIIDÆ.

Scudderia texensis S. & P.

Gainesville, Sept. 26–Oct. 3, 2 males.

Scudderia furcata furcata Brunner.

Gainesville, Sept. 26–Oct. 2, 1 male, 1 female; Monticello, Oct. 4–8, 1 male; De Funiak Springs, 1 female.

Scudderia cuneata Morse.

Gainesville, Sept. 26–Oct. 2, 1 female; Monticello, Oct. 4–8, 1 male, 2 females; Pensacola, Oct. 11–14, 1 male.

Microcentrum rhombifolium Sauss.

Gainesville, Sept. 26–Oct. 2, 3 males, 3 females.

Stilpnochlora marginella Serv.

Gainesville, Sept. 26–Oct. 2, 1 male, 1 female.

Belocephalus subapterus Scudd.

Gainesville, Sept. 26–Oct. 2, 1 male.

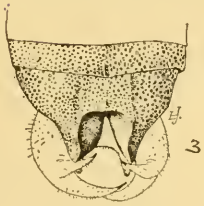
Belocephalus excavatus, new species.

Resembles *B. rehni* in size, but the fastigium is sharp pointed about as in *B. subapterus*. The supra-anal plate is formed more as in *B. micanopy*, a blunt headed species from Big Pine Key.

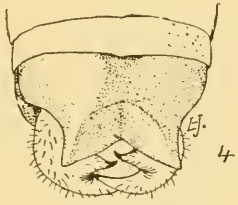
Type: Brown male; Gainesville, Florida, Oct. 2, 1914. (Mutchler and Watson) [American Museum of Natural History collection].

Mandibles, lower edge of front and base of antennæ beneath, black. The upper surface of the head and pronotum with a faint line not well defined on either side of a yellowish color, which is bordered interiorly with blackish, the enclosed space between the black lines brown in color. The stripes extend from the fastigium backward to the base of the thorax. Fastigium sharp pointed, about as in *subapterus,* slightly bent downward and tipped with black. Inferior basal tooth of fastigium also tipped with black. Antennæ longer than the body, with the joints annulated with black. Abdomen with a well-defined interrupted carina. The femora and tibiæ of all of the legs blotched with brown, and the tips of the spines black. The supra-anal plate with the V-shaped notch narrow and the inner sides but little curved, not considerably so as in *micanopy.* The excavated part surrounding the notch has the sides declivitous, more so than in any other *Belocephalus* thus far described. The outer extremities of the subgenital plate are not bent upward and inward and produced into points.

	Male, Mm.
Length of body	24.0
Length of fastigium beyond base of antennæ	2.5
Length of pronotum	7.0
Length of tegmen	7.0
Length of caudal femur	13.5



B. excavatus.



B. subapterus.

Only the type was collected, but the supra-anal plate is shaped so differently from that of any other known *Belocephalus* that it is evidently distinct. This species should be considered in the tables for the determination of *Belocephalus,* published in this Journal in September, 1914, next to *subapterus,* from which it may be easily separated by the accompanying excellent figures by Mr. Louis H. Joutel.

Neoconocephalus triops L. (*mexicanus* Sauss.)

Gainesville, Sept. 26–Oct. 2, 1 female nymph; Monticello, Oct. 4–8, 1 male.

Neoconocephalus retusus Scudd.

Gainesville, Sept. 26–Oct. 2, 1 female.

Odontoxiphidium apterum Morse.

Gainesville, Sept. 26–Oct. 2, 5 males, 2 females; Monticello, Oct. 4–8, 1 male; De Funiak Springs, Oct. 17–19, 1 male; Pensacola, Oct. 11–14, 1 male, 1 female nymph.

Orchelimum agile De Geer.

Gainesville, Sept. 26–Oct. 2, 1 female.

Orchelimum militare R. & H.

Crestview, Oct. 15–16, 1 male, 1 female.

Conocephalus fasciatus De Geer.

Gainesville, Sept. 26–Oct. 2, 2 males; Pensacola, Oct. 11–14, 1 male.

Conocephalus brevipennis Scudd.

Gainesville, Sept. 26–Oct. 2, 1 female.

Atlanticus gibbosus Scudd.

Crestview, Oct. 15–16, 1 female.

GRYLLIDÆ.

Ellipes minuta Scudd.

Gainesville, Sept. 26–Oct. 2, 1.

Cryptoptilum trigonipalpum R. and H.

Monticello, Oct. 4–8, 1 female.

Nemobius fasciatus socius Scudd.

Gainesville, Sept. 26–Oct. 2, 1 male, 1 female; Monticello, Oct. 4–8, 1 male.

Nemobius ambitiosus Scudd.

De Funiak Springs, Oct. 17–19, 1 female nymph; Crestview, Oct. 15–16, 1 male, 1 female.

Gryllus assimilis Fabr.

Gainesville, Sept. 26–Oct. 2, 3 males, 1 female; Monticello, Oct. 4–8, 1 male, 1 female; De Funiak Springs, Oct. 17–19, 1 male, 2 females; Pensacola, Oct. 11–14, 1 female.

Pending a revision of the genus *Gryllus* all of the specimens have here been placed under the name *assimilis,* which has been recorded from the southern United States. The members of the genus vary greatly in size and color from various parts of the state, and often

from the same locality, so that to assign them names has been always unsatisfactory.

Phylloscirtus pulchellus Uhler.
Monticello, Oct. 4–8, 1 female.

Œcanthus angustipennis Fitch.
Gainesville, Sept. 26–Oct. 2, 1 female; Monticello, Oct. 4–8, 1 female.

Œcanthus quadripunctatus Beut.
Gainesville, Sept. 26–Oct. 2, 1 nymph.

Hapithus brevipennis Sauss.
Gainesville, Sept. 26–Oct. 2, 1 female.
Hapithus quadratus Scudd.
Gainesville, Sept. 26–Oct. 2, 1 female.

THE AMERICAN SPECIES OF THE GENUS MIOGRYLLUS (ORTHOPTERA, GRYLLIDÆ).

By Morgan Hebard,

Philadelphia, Pa.

Recent studies in the group Gryllites, of which the present genus is a member and in which, in our opinion, it stands after *Gryllodes* and before *Gryllus,* have demonstrated that in the past the true value and significance of many morphological features of the present group have been wholly miscalculated. There is no question but that in this group various species exhibit the greatest plasticity found in the Orthoptera and enjoy as wide a distribution as any American forms, excepting those which have been spread by the agency of man. Unless we consider that these great plastic units have always been treated systematically without the following features being realized, the amount of synonymic names for many species would be incomprehensible.

Variations found in the Group Gryllites.—Many species vary greatly in size, as in the Orthoptera generally, this variation often being geographic but frequently due to local environmental conditions.

A megacephalic condition is met with in occasional individuals, particularly of the male sex; in some of these males the head is frequently not only disproportionately swollen, but the face at the clypeal suture suddenly sunken in, thus affording an unusual and distinctive appearance. In such specimens the pronotum is, as a result, more enlarged cephalad than is normal.

The wings are often fully developed as organs of flight or very greatly aborted in the same species irrespective of sex, and the tegmina also vary from an elongate condition to one of decided abbreviation. It is true that some species with extremely abbreviate tegmina apparently never develop a form having long tegmina or wings, but these are rare and, as in many other groups of Orthoptera, the majority of the species exhibit both macropterous and brachypterous or micropterous forms. Throughout the present paper we have referred to the macropterous and micropterous condition, using these terms in application to the wings only and not to the tegmina.

The length of the ovipositor varies greatly in the majority of the species and has been proven by experiment to be chiefly influenced by local soil conditions.[1]

The foramen on the inner face of the cephalic tibia is always membranous and distinct in macropterous specimens, but in the brachypterous condition of the same species this opening varies individually from that type to one in which it has completely disappeared. In all forms of the present group the foramen on the outer face of the cephalic tibia is always the largest, membranous and distinct. This organ appears only when the adult condition is reached.

The number of spines on the dorsal margins of the caudal tibia is never absolutely constant in material of a single species, nor is the relative length of the six distal spurs. In these respects, however, different species do show different averages.

In a great number of species the general coloration is very dark and the color pattern almost obliterated. In such species, the color pattern appears fully only in specimens of recessive coloration, which gives such material a distinctive appearance.

[1] See Lutz, The Variation and Correlations of Certain Taxonomic Characters of Gryllus, pp. 1–63 (1908).

MIOGRYLLUS Saussure.

1877. *Gryllus,* 2d Section *Miogryllus* Saussure, Mélang. Orthopt., II, p. 362.
1897. *Miogryllus* Saussure, Biol. Cent.-Amer., Orth. I, p. 227.
1901. *Miogryllus* Scudder, Psyche, IX, p. 256.

The genus included five species. Genotype.—*Miogryllus pusillus* [*Gr*[*yllus*] *pusillus*] (Burmeister)=*Miogryllus convolutus* [*Gryllus convolutus*] (Johannson), selected by Kirby, 1906.

This genus includes a number of species which are closely related to the genus *Gryllus* and for which no definite single differential characters exist, excepting the form of the titillatores (a portion of the male genitalia concealed within the subgenital plate), and in the proportions of the wings; in the long-winged condition, wings which are proportionately much longer than the tegmina (in *Miogryllus,* 2½ to 3½ times the tegminal length, in *Gryllus,* in the majority of species normally 1½ times this length but in a few species 2 or slightly more than 2 times the tegminal length), while in material having the wings greatly reduced and hidden by the tegmina, these organs are perfect though greatly reduced in *Gryllus,* but small pad-like appendages in the present genus. All of the species average smaller than do the American forms of *Gryllus* and have the spines of the dorsal margins of the caudal tibiæ, in the great majority of specimens, 4 or 5 in number (this being fewer than is normal in *Gryllus*), less heavy and not as rigidly fixed in their sockets as in that genus. The male tegmina have normally 2, but occasionally 1 or 3, transverse veins (in *Gryllus* the number is normally 4 or 5, rarely 3 or 6). The male titillatores are formed by two dark chitinous perpendicular plates which are uncinate dorsad, between the dorsal margins of which are two small acicular projections of equal length. In the American forms of *Gryllus* the medio-dorsal portion of this organ is produced in a large horizontal triangular plate with apex curved upward. The species agree with those of *Gryllus* in having a large membranous foramen on the outer face of the cephalic tibiæ and also a smaller but distinct membranous foramen on the inner face of the same, excepting in micropterous individuals where this inner foramen is frequently greatly reduced or absent on one limb or both.

History.—No species have been incorrectly referred to the present

genus. As will be seen by consideration of the nomenclature, the species have been variously described as members of *Nemobius, Gryllus, Miogryllus* and *Gryllodes*. The use of the generic name *Nemobius* in this connection was inexcusable, for the group Nemobiites, to which that genus belongs, is separable by the unarmed dorsal margins of the caudal metatarsus and other adequate and constant characters. The three other genera are, however, very closely associated and are based on characters which are elusive and (excepting one sexual character) variable, though each genus properly considered includes forms which constitute recognizable units and are in our opinion worthy of retention. A number of the smallest Old World species, which are placed in *Gryllus,* show a decided tendency toward the present genus.

Distribution of Genus.—In America: from Staten Island, New York; Knox County, Indiana; South Bend, Nebraska; Alamogordo, New Mexico; Las Vegas, Nevada, and San Diego, California, southward to Buenos Aires and Mendoza, Argentina. In South America the genus is apparently absent on the west coast, west of the Andes.

Specimens Examined.—In the preparation of the present paper the following types have been before us.

(*Nemobius distinguendus* Scudder, synonym of *Miogryllus convolutus* (Johannson).)

(*Nemobius delicatus* Scudder, synonym of *Miogryllus convolutus* (Johannson).)

Miogryllus ensifer (Scudder).

Miogryllus lineatus (Scudder).

(*Nemobius pictus* Scudder, synonym of *Miogryllus lineatus* (Scudder).)

(*Miogryllus capitatus* Scudder, synonym of *Miogryllus lineatus* (Scudder).)

(*Miogryllus sicarius* Scudder, synonym of *Miogryllus lineatus* (Scudder).)

(*Gryllus saussurei* Scudder, synonym of *Miogryllus verticalis* (Serville).)

(*Miogryllus oklahomæ* Caudell, synonym of *Miogryllus verticalis* (Serville).)

The total number of specimens examined in the preparation of the present paper is 391, of these 301 are in the Hebard Collection

and that of the Academy of Natural Sciences of Philadelphia. The collections of the United States National Museum, Museums of Comparative Zoölogy and Brooklyn Institute of Arts and Sciences have been examined through the kindness of their curators and we have been further assisted by Professor A. P. Morse, Mr. Wm. T. Davis and Dr. J. Chester Bradley. For this kind coöperation we wish to express our deepest gratitude.

Miogryllus convolutus (Johannson).

1763. *Gryllus convolutus* Johannson, Amoen. Acad., VI, p. 399. [Surinam.] (Macropterous ♀.)

1773. *Gryllus ater* De Geer, Mém. l'hist. Ins., III, p. 520. [Surinam.] (Macropterous ♀.)

1838. *Gr*[*yllus*] *pusillus* Burmeister, Handb. Entom. II, 2 Abth., pt. 1, p. 733. [Brazil.] (Macropterous.)

1858. *Gryllus nitidulus* Stål, Kongl. Svensk. Freg. Eug. Resa, II, p. 315. [Buenos Aires, Argentina.] (Micropterous ♀.)

1874. *Gryllodes micromegas* Saussure, Miss. Sci. Mex., Rech. Zool., VI, p. 418. [Mexico.] (Micropterous ♀.)

1874. *Gryllodes brevipennis* Saussure, Miss. Sci. Mex., Rech. Zool., VI, p. 418. [Peru.] (Micropterous ♀.)

1874. *Gryllodes parvipennis* Saussure, Miss. Sci. Mex., Rech. Zool., VI, p. 419. [Santa Catarina, Brazil.] (Micropterous ♀.)

1896. *Nemobius distinguendus* Scudder, Jour. N. Y. Ent. Soc., IV, p. 101. [Orizaba, Mexico.] (Micropterous ♀.)

1896. *N* [*emobius*] *delicatus* Scudder, Psyche, VII, p. 433. [San Rafael, Vera Cruz, Mexico.] (Macropterous ♂ and ♀.)

No other species of Orthoptera in the large collections from the Guianas before us fits Johannson's brief description of *convolutus*, with which large series of macropterous examples of the present insect agree perfectly. De Geer's *ater* is evidently a slightly amplified description of the same insect. Burmeister's *pusillus* from Brazil agrees also in every detail, and he further describes the normally striking coloration of the caudal femora; his description is of the macropterous condition also, but with tegmina more abbreviate. Stål's *nitidulus* represents the larger and somewhat paler condition found in Argentina as demonstrated by material before us; these differences are by no means sufficient to warrant the retention of the name as a geographic race. His specimen is micropterous but with long tegmina, a condition also represented in material before us,

though usually in such material the tegmina are distinctly shorter. That author gives five spines for the dorsal margin of the caudal femora, this is unusual for the species and found in but few specimens before us; it is very possible that he included the dorso-external spur, which equals in size the marginal spines. Saussure's *micro-megas* is based on a small micropterous specimen with ovipositor of minimum length; *brevipennis* a larger pale micropterous individual showing nearly the maximum of tegminal abbreviation, and *parvipennis* similar but with tegmina somewhat less abbreviate. The presence (*brevipennis*) or absence (*parvipennis*) of a foramen on the inner face of the cephalic tibia has caused these two names to be placed in different genera: this is a condition now known to be variable within the species. In addition to the variants referred to above, we find in the present species some slight variation in the size and convexity of the head, form of maxillary palpi (varying in the oblique truncation of the distal segment, which reaches to a point from slightly less than to a little beyond the middle of the ventral margin) and proportions of the caudal femora, which would be expected in a plastic species enjoying so extensive a distribution and which, accompanied by the varied appearance mentioned above, apparently led Saussure to describe the three specimens before him as distinct.

The types before us of Scudder's *Nemobius distinguendus* and *delicatus* leave no room for doubt. That author, evidently through sheer carelessness, forgot the character which so definitely separates the Nemobiites from the Gryllites. Absence or presence of elongate wings are the additional factors principally responsible for the two names.

This small, usually dark species, which has generally been determined as *pusillus* by authors, is one of the most variable and widely ranging of the American Gryllidæ. The features most worthy of remark are as follows: Head little broader than pronotum, slanting and scarcely convex from summit of occiput to the large but not strongly produced interantennal protuberance; strikingly buffy, narrow, divergent lines run back from lateral ocelli. Maxillary palpi rather heavy, distal segment obliquely truncate; palpi blackish except fourth and proximal portion of fifth (distal) segment, which portions are

whitish.[2] Pronotum subequal in width. Cephalic tibiæ with very large nearly elliptical foramen on outer face and smaller ovoid foramen, also membranous, on inner face, except in wingless individuals in which inner tympanum is frequently absent on one limb and occasionally on both. Caudal femora with ventro-proximal portion strikingly paler than other portions of limb.[3] Dorsal margins of caudal tibiæ normally armed with four and four spines;[4] dorso- and medio-

MEASUREMENTS (IN MILLIMETERS) OF EXTREMES.

Male.	Length of Body.	Length of Pronotum.	Length of Tegmen.	Length of Wing.	Length of Caudal Femur.
San Rafael, V. C., Mexico	8.5–9	1.7–1.9	4.0–4.2	11.9–12.6	5.4–5.8
Medellin, V. C., Mexico	9.0–10.3	1.8–2	3.7–4.4	12.2–14.9	6.0–6.9
Benque Viejo, Br. Honduras	8.6	1.7	3.9	11.7	5.6
Tabernilla, Panama	8.7– 9.7	1.7–1.8	4.0–4.3	12.6–13.7	5.6–6.1
Ancon, Panama	7.4– 8.2	1.5–1.9	3.0–3.3	—	5.7–5.8
Bartica, Br. Guiana	8.0–10.5	1.6–2.2	3.4–4.6	11.2–14.1	5.1–6.7
Kaiteur, Br. Guiana	6.7	1.3	2.8	—	4.8
Igarapé Assu, Brazil	9.6–10.5	1.7–2.1	4.1–4.2	12.1–13.3	5.7–6.3
Manáos, Brazil	9.0– 9.7	1.9–2	4.2–4.7	12.3–12.7	6
Carcaraña, Argentina	10.2	2.4	5.2	14.4	7
Extremes of series	6.7–10.5	1.3–2.4	2.8–5.2	11.2–14.9	4.8–7

Female.	Length of Pronotum.	Length of Tegmen.	Length of Wing.	Length of Caudal Femur.	Length of Ovipositor.
San Rafael, V. C., Mexico	2.0–2.2	3.7–4.3	12.3–12.9	6.4–6.9	7.2–7.3
Medellin, V. C., Mexico	1.9–2.2	3.7–4.1	12.3–14	6.1–7.3	6.5–7.4
Medellin, V. C., Mexico	1.9	3.9	—	6.8	6.8
Orizaba, V. C., Mexico	2.2	5.1	—	7.3	7.4
Benque Viejo, Br. Honduras	2.2	4.1	—	7.2	7
Pózo Azúl, Costa Rica	1.9–2.2	4.7–4.9	13.7–14	6.6–6.9	7.8–7.9
Tabernilla, Panama	2.1	3.8	13.7	6.7	7
Ancon, Panama	2.3	2.8	—	6.9	6
Bartica, Br. Guiana	1.9–2.3	4.4–5.7	13.0–16.4	5.9–8	6.2–9.7
Kaiteur, Br. Guiana	1.9–2	2.3–2.7	—	5.7–6	5.6–6.2
Igarapé Assu, Brazil	1.8–2.1	4.3–4.6	13.7–14	6.7–6.9	7.2–8.2
Contamano, Peru	2.3	4.6	—	7.8	8.3
Chanchamayo, Peru	2.1	4.7	14.6	7	8
Carcaraña, Argentina	2.4	5.4	15.8	7.2	8.6
Extremes of series	1.8–2.4	2.3–5.7	12.3–16.4	5.7–8	5.6–9.7

[2] In occasional paler specimens, the dark portion is brownish and confined to the three proximal segments and distal portion of the fifth, while in a few very dark examples the palpi, excepting the median portion of the fourth segment, are blackish.

[3] In pale examples, this difference of coloration is appreciable but by no means as decidedly pronounced.

[4] Rarely five are found, as discussed above.

internal spurs longest and subequal in length. The ovipositor is long and very slender with smooth apex but little enlarged; it is extremely variable in length and varies from rigidly straight to rather strongly curved, this latter condition apparently frequently accentuated in drying.

In this series of females the extremes of body length are 8.4–12.7 mm., those extremes found in the series from Kaiteur and Bartica, British Guiana, respectively. The very large series before us from the latter locality shows that a very great amount of variation exists, irrespective of geographic distribution. As in numerous other groups which we have studied, material is evidently greatly influenced by local environmental conditions.

The great majority of specimens before us are blackish and shining in general coloration, with wings, when present, contrastingly whitish. Some examples, however, are dark brown with lateral margins of dorsum of pronotum outlined in a paler shade and limbs brown, the ventro-proximal pale portion of the caudal femora in consequence not as contrastingly colored. The lateral lobes of the pronotum are always dark and uniform in color. The head is often narrowly and briefly bistriate on the occiput between the two distinctive lateral lines discussed above, which are present in every specimen before us. These latter lines, in rare specimens, widen distad and overspread the entire interantennal protuberance and adjacent portion of the occiput, giving such individuals an unusual facial aspect.

The known distribution of this species is defined by the material before us and that quoted in the synonymy when we add to this the record of *brevipennis* by Giglio-Tos from Gualaquiza, Ecuador, that by Caudell of *pusillus* from Sapucay, Paraguay, those of *pusillus* and *brevipennis* by Chopard from various localities in French Guiana and that of *nitidulus* by Berg from Cerro de Sotoya, Argentina.

Specimens Examined.—200; 59 males, 136 females and 5 immature females.

Jalapa, Vera Cruz, Mexico, 1 ♀ [A. N. S. P.] (micr., l. teg.).[5]

[5] The following abbreviations are used:— dk. = dark; micr. = micropterous; macr. = macropterous; l. = long; med. = medium; pl. = pale; mod. = moderately; megac. = megacephalic; sh. = short; v. = very; teg. = tegmina.

Orizaba, V. C., Mex., I, 1892, 1 ♀, type *Nemobius distinguendus* Scudder [Hebard Cln.; type no. 398] (micr., v. l. teg.).

Medellin, V. C., Mex. (Rev. T. Heyde), 4 ♂, 6 ♀, 1 juv. ♀ [Hebard Cln.] (1 ♀ micr., med. teg.).

San Rafael, V. C., Mex. (C. H. T. Townsend), 5 ♂, 5 ♀, including type series *Nemobius delicatus* Scudder [Hebard Cln.; type no. 400] (macr.).

Benque Viejo, British Honduras, VII, 1906 (W. A. Stanton), 1 ♂, 1 ♀ [U. S. N. M.] (macr.).

San José, Costa Rica, V and VI, 1902 and 1906 (P. Biolley; 1 at light), 2 ♀ [Hebard Cln. and A. N. S. P.] (macr.).

Pózo Azúl de Pirris, C. R., V, 10 to 20 (M. A. Carriker Jr.), 3 ♀ [Hebard Cln.] (macr.).

Tabernilla, Canal Zone, Panama, V. 4 and 9, 1907 (A. Busk), 2 ♂, 1 ♀ [U. S. N. M.] (macr.).

Ancon, C. Z., Panama, XI, 16, 1913 (M. Hebard; in heavy marsh grass), 4 ♂, 1 ♀ (Hebard Cln.] (macr., v. sh. teg.).

Caparo, Trinidad, VI to VII, 1913 (S. M. Klages), 2 ♂, 9 ♀ [A. N. S. P. and Hebard Cln.] (1 ♂, 7 ♀ micr., v. sh. teg.).

Kaiteur, British Guiana, VII, 31 to VIII, 12, 1911 (F. E. Lutz), 1 ♂, 3 ♀ [A. M. N. H.] (micr., v. sh. teg.).

Rockstone, B. G., VII, 9, 1911 (Crampton and Lutz), 1 ♀, 1 juv. ♀ [A. M. N. H.] (micr., med. teg.).

Bartica, B. G., XII, 31, 1912 to IV, 14, 1913 (S. M. Klages), 28 ♂, 82 ♀ [A. N. S. P.] (macr., but 1 ♀ micr., l. teg.); V. 21, 1901 (R. G. Crew), 1 ♀ [A. N. S. P.] (macr.).

Paramaribo, Dutch Guiana (K. Mayo), 1 ♀ [A. N. S. P.] (micr., med. teg.).

Ceará, Ceará, Brazil (F. Rocha), 1 ♀ [U. S. N. M.] (macr.), dried alcoholic.

Bonito, Pernambuco, Brazil (A. Koebele), 4 ♂, 1 ♀ [U. S. N. M.] (2 ♂ macr.).

Pará, Pará, Brazil (C. F. Baker), 2 ♀ [A. N. S. P.] (macr.).

Igarapé Assu, Pará, Brazil, I, 17 to II, 6, 1912 (H. S. Parish), 4 ♂, 9 ♀ [A. N. S. P.] (macr.).

Manáos, Amazonas, Brazil (Mann and Baker), 2 ♂ [A. N. S. P. and Stanford Univ.] (macr.).

Porto Velho, Rio Madeira, Brazil (Mann and Baker), 1 ♂ [A. N. S. P.] (macr.).

Contamano, Rio Ucayali, Peru, X to XI, 1912, 3 ♀, 3 juv. ♀ [A. N. S. P.] (1 micr., v. l. teg.), alcoholic.

Chanchamayo, Peru, 1 ♀ [A. N. S. P.] (macr.).

Carcaraña, Santa Fé, Argentina, 1 ♂, 1 ♀ [A. N. S. P.] (macr.).

Miogryllus ensifer (Scudder).

1896. *Nemobius ensifer* Scudder, Jour. N. Y. Ent. Soc., IV, p. 101. [Central America.] (Macropterous ♀.)

This species shows near relationship to *M. convolutus,* differing in the average larger size, normal chestnut general coloration, longer and wholly pale maxillary palpi with apex of distal segment less strongly truncate (this occupying but distal third of ventral margin), head with longitudinal lines when present only faintly indicated on occiput and the lateral pair never continued beyond this point, lateral lobes of pronotum which often show traces of a dark stripe dorsad, wings always distinctly tinged with chestnut, caudal femora which are not distinctively marked and ovipositor which averages decidedly longer.

The two species agree in the armament of the caudal tibiæ and in the form of the male titillatores. The other species of the genus are larger, heavier forms, with caudal femora bearing an average of five spines on the dorsal margins, instead of the average of four found in *convolutus* and *ensifer.*

MEASUREMENTS (IN MILLIMETERS) OF EXTREMES.

Male.	Length of Pronotum.	Length of Tegmen.	Length of Wing.	Length of Caudal Femur.	Length of Ovipositor.
Tabernilla, Panama	2.3–2.4	5.8–6	15.1–16.1	7.2–7.7	—
Female.					
Central America. Type	2.6	5.8	15.2	7.7	8.6
Tabernilla, Panama	2.5–3.2	5.3–6.7	15.6–19.3	7.7–9.7	8.8–11
Georgetown, Br. Guiana	2.7	4.8	16.3	8.2	—

The extremes of body length are: males, 11–12.1, females 11.1–14 mm. Though the series before us is not large enough for definite conclusions, it would appear that the present species is by no means as variable as *convolutus.*

In this species the median ocellus is usually strongly defined by a pale yellowish spot, in *convolutus* no such marking surrounds this organ. The limbs are slightly paler than the chestnut general coloration of the body, but are speckled and suffused with that shade. In numerous specimens the ventro-caudal portion of the dorsum of the pronotum is marked with pale yellowish brown, which color is continued on the tegmina occupying the intermediate channel. In one male before us the right tegmen has but one instead of the normal two transverse veins. All of the specimens in the present series are macropterous.

This species is known only from the material here studied.

Specimens Examined.—23; 7 males and 16 females.

Central America (Rev. T. Heyde), 2 ♀ [Hebard Cln.; type no. 397].

Tabernilla, Canal Zone, Panama, V, 1 to VI, 16, 1907 (A. Busk), 7 ♂, 13 ♀ [U. S. N. M.].

Georgetown, British Guiana, 1 ♀ [A. N. S. P.].

Miogryllus lineatus (Scudder).

1876. *Gryllodes lineatus* Scudder, Ann. Rept. Chief of Engineers, 1876, part III, p. 499. [Between Virgin River and Fort Mojave, Arizona.] (Micropterous ♀.)

1896. *N[emobius] pictus* Scudder, Psyche, VII, p. 434. [Colorado, New Mexico.] (Macropterous ♀.)

1901. *Miogryllus capitatus* Scudder, Psyche, IX, p. 257. [Gulf Coast of Texas.] (Micropterous ♂, 2 juv.)

1901. *Miogryllus sicarius* Scudder, Psyche, IX, p. 258. [San Diego, California.] (Macropterous ♀.)

After study of the types of all of the above names and also the series listed below, we are able to place the last three without question in the present synonymy. The type of *lineatus* is a rather dark female with short tegmina and concealed, greatly aborted wings; *pictus* is based on a pale macropterous female; *capitatus* on a male with truncate tegmina and concealed, greatly aborted wings, particularly aberrant in showing a strongly megacephalic condition, which development is discussed below; while *sicarius* is a female, exactly like the type of *pictus,* with which specimen it was evidently not compared, this probably due to the fact that *pictus* had been described as a member of *Nemobius* in a paper in which Scudder evi-

dently wholly overlooked the most distinctive character which separates the Gryllites from the Nemobiites.

This species is closely related to *M. verticalis,* but is much less variable than that species. It may be distinguished by its less robust form; very pale general coloration; occiput and vertex which are multi-fasciate (in *verticalis* the pale median lines, if present basally, scarcely ever reach beyond the summit of the occiput); normally distinct color pattern, with lateral lobes often wholly darkened in the specimens of deepest coloration (in *verticalis* darkest individuals, excepting rarely among those which are black in general coloration, still have pale ventral margins of these lobes); decidedly more delicate tegmina and wings, with veins less pronounced and in the micropterous males with tegmina squarely truncate (normally decidedly more rounded in *verticalis*), and with armament of caudal tibiæ similar, but with spines and spurs more delicate. The number of such spines is normally five on each margin, very rarely six are found.

A megacephalic condition (described as *capitatus*) is occasionally found in males of this species.[6] In such specimens the head is swollen out of all proportion to the rest of the insect, this causing the pronotum to expand somewhat cephalad. In such specimens a sudden and very marked flattening at the base of the clypeus often occurs, giving a further distinctive appearance to these individuals. The causes of this abnormality are unknown. We find it strikingly pronounced in occasional males of *verticalis* also, and it is known to occur in other species of Gryllidæ, while in certain genera of Stenopelmatinæ, such as *Deinacrida, Anostostoma, Carcinopsis,* etc.,[7] where the head is tremendously enlarged and the mandibles specialized, particularly in the males, such specialization is known to exhibit the greatest variability within each species. When we consider that this development is nearly always much less pronounced in the female sex and that the males of the Gryllidæ are known to be extremely pugnaceous, it would appear probable that this megacephalism is a development intimately associated with the struggle for supremacy between individuals of the stronger sex. The apparently rare occur-

[6] This condition appears to be frequently developed on the Gulf coast of Texas, we have no other examples of megacephalism from elsewhere in the distribution of the species.

[7] See Brunner, Verh. k.-k. zool.-bot. Gesellsch. Wien, XXXVIII, p. 251 (1888).

rence, but pronounced degree when present, of this specialization in this and other species, is a feature the solution of which will probably require both extensive field studies and breeding experiments.

In the present species a large ovoid membranous foramen is present on the internal face of the cephalic tibia in all macropterous specimens, but in the micropterous examples before us this place is indicated merely by a slight unmodified depression of the chitin. As in the other species of the genus, opposite this point on the outer face, a larger, nearly elliptical, membranous foramen is always present in the adult condition.

Measurements (in Millimeters) of Extremes.

Male.	Length of Pronotum.	Length of Tegmen.	Length of Wing.	Length of Caudal Femur.	Length of Ovipositor.
Las Vegas, Nevada	2.5–2.8	4.4–5.1	—	7.8–8.3	—
Yuma, Arizona	2.1–2.7	5.6–5.8	15.5–16.8	7.3–8.2	—
Brownsville, Texas	2.3	6.9	17	8.2	—
Brownsville, Texas	2.7	5	—	9.3	—
Gulf coast, Texas (Type, *capitatus*)	3	5.8	—	9.7	—
Female.					
Yuma, Arizona	2.6–2.8	5.1–6.5	15.9–18.3	7.6–8.3	9.8–11
Brownsville, Texas	2.4–2.7	7.0–7.1	17.1–18.3	8.7–9.2	8.0–8.7

The extremes of body length are; males, 12.8–16, females 12.7–14.2 mm. In the series from Brownsville, the caudal femora average somewhat longer and in the females the ovipositor averages shorter than in material from the southwestern United States, but, considering the known variability within the species, it appears wholly unlikely that further material will exhibit sufficient constant geographic variation to warrant the recognition of an eastern race.

The general coloration of the present insect is pale yellowish brown, marked with a darker shade. The abdomen is dark, with two meso-lateral bands of paler brown which vary from decidedly wide to moderately narrow in different individuals.

Of the material here studied probably nearly all the macropterous individuals were taken when attracted to lights at night. It is a difficult matter to capture this very active insect in its native environment under rocks, stones or various rubbish, and this undoubtedly accounts for the scarcity in collections of micropterous material.

This also probably explains the great gaps in the known distribution of the insect, which we believe will be found to be widely and generally distributed over the desert and semi-desert regions of the southwestern United States and northern Mexico. It constitutes the only known desert adaptation of the genus.

In addition to the localities quoted in the synonymy and those given below, the present species has been correctly recorded by Rehn from Tucson, Arizona. The two records of immature individuals of the same species by that author from Florence, Arizona, and Alamogordo, New Mexico, are properly referable to *Gryllus assimilis* of the *personatus variant.*

Beside the types mentioned above we have had before us the following series of 42 specimens, 20 males and 22 females.

Las Vegas, Nevada, VIII, 9, 1907 (Hebard; in ore pile) 2 ♂;[8] IX, 2, 1909 (Hebard; among rocks) 1 ♂ [all Hebard Cln.] (all micropterous).

Yuma, Arizona, VII, 27 and 28, 1907 (Rehn and Hebard; attracted to light), 14 ♂, 16 ♀[9] [A. N. S. P. and Hebard Cln.] (macropterous).

Esperanza Ranch, Brownsville, Texas, V to VIII, 1, 1903 and 1904 (C. Schaeffer), 3 ♂, 6 ♀[10] [Mus. Bkln. Inst. A. & S. and U. S. N. M.] (2 ♂ micropterous and megac.).

Miogryllus bohlsii (Giglio-Tos).

1895. *G[ryllodes] bohlsii* Giglio-Tos, Zool, Jahrb., Abth. Syst., VIII, p 817. [Paraguay.]

We have been unable to obtain material of this insect described from a single wingless male. It is described as closely related to *saussurei*=(*verticalis*), differing in the smaller and less swollen head, pronotum which narrows cephalad, tegmina which have the apical area equal the remaining portion in length and spines of dorsal margins of caudal tibiæ which number 7 and 6.

[8] Recorded by Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1909, p. 483 (1910).

[9] Recorded by Rehn and Hebard as *M. pictus,* Proc. Acad. Nat. Sci. Phila., 1908, p. 401 (1908).

[10] Caudell recorded 1 ♀ as *M. pictus* and 2 ♂ as *M. capitatus* from this series, Bklyn. Inst. Mus., Sci. Bull., I, p. 115 (1904).

So much variation is to be found in *verticalis*, that this insect may prove to be a mere aberration, but, in the absence of material agreeing with the description in several of the features mentioned above, we await further information.

Miogryllus verticalis (Serville).

1839. *Gryllus verticalis* Serville, Hist. Nat. Ins., Orth., p. 343. [Cayenne, French Guiana.] (Macropterous ♀.)

1874. *Gryllus la platae* Saussure, Miss. Sci. Mex., Rech. Zool., VI, p. 408. [Buenos Aires, Argentina.] (Micropterous ♂ and ♀.)

1877. *Gry[llodes] guyennensis* Saussure, Mélang. Orthopt., II, p. 384. [Surinam.] (Micropterous ♀.)

1877. *Gryllus saussurei* Scudder, Proc. Bost. Soc. Nat. Hist., XIX, p. 35. [Georgia.] (Micropterous ♂♂.)

1902. *Miogryllus oklahomae* Caudell, Trans. Am. Ent. Soc., XXVIII, p. 90. [Perkins, Oklahoma.] (Micropterous ♂.)

Although Serville's description of *verticalis* is very brief and based on a single female, then in poor condition, there is no doubt that the specimen described represents the rare macropterous condition of the present species. No other species of American Gryllidæ agrees with Serville's measurements; body about 16 mm., wings surpassing tegmina by about 12 mm. This great wing length is found in the three macropterous specimens of the species before us and precludes the possibility of the name being a synonym of *Gryllus assimilis* as placed by Saussure in 1874.[11] In other features of Serville's description there are no discrepancies with our material.

Saussure's *laplatæ* is based upon micropterous material of both sexes of this species. After examination of the types of Scudder's *saussurei* and Caudell's *oklahomæ* and large series of the species before us, there remains no doubt of the synonymy of these names. The former is based on material inseparable from the synonymous *laplatæ* in every respect except size, while the latter represents only the maximum degree of coloration found in this plastic species. Saussure's *guyennensis* is based solely on a female with shorter ovipositor (9.7 mm. in length) than that of the female type of the synonymous *laplatæ* (13 mm. in length), and tegmina showing nearly the maximum of abbreviation and in consequence not meeting dorsad.

[11] Miss. Sci. Mex., Rech. Zool., VI, p. 397.

Such differences are mere individual variations, as found frequently in the series before us.

So very wide a distribution is very unusual, but such has been found to occur likewise in *Gryllotalpa hexadactyla,* and evidence is at hand of still other species which range from temperate North America through the tropics to temperate South America.

It is of interest to note that the present species is probably found in largest numbers in temperate regions, where no macropterous individuals have been found, but that among the limited series before us from tropical America three are macropterous and in these the internal face of the cephalic tibiæ bear a large membranous tympanum, this place being not defined or merely indicated by a slight unmodified depression in the great majority of the large series of micropterous individuals before us. The exceptions among the micropterous series which exhibit a small membranous foramen in this position appear to be found chiefly among megacephalic individuals.

This, the heaviest species in the genus, which shows the nearest approach to the type found in *Gryllus,* is the most widely distributed and also the most plastic of the species of the genus. The features most worthy of remark are as follows: average size large for the genus, rather small when compared with *Gryllus;* form robust and compact. Head large with occiput rounded and but little flattened to the broad inter-antennal protuberance, frequently marked proximad with narrow parallel lines, supra-ocular pair often extending to the lateral ocelli, lines between these with but rare exceptions very brief, terminating at crest of occiput. In intensive condition of coloration all trace of cephalic marking is lost, entire head being shining black. Maxillary palpi rather heavy, with distal joint obliquely truncate, this truncation extending over two-thirds to three-fifths of ventral margin; palpi vary in color from a pale yellowish type (in palest specimens) through one in which distal segment is darkened (normal) to one in which they are entirely darkened (extreme of intensive coloration). Tegmina in both macropterous and micropterous males narrowing more gradually distad than in *lineatus,* with texture less delicate and veins heavy and well defined in both sexes. Number of transverse veins in male normally two, very rarely one or three. Micropterous females have tegmina decidedly aborted and broadly rounded, normally attingent mesodorsad but occasionally overlapping or separated

by a brief space. Pronotum broad, transverse, with lateral margins subparallel or very slightly expanding cephalad (whenever the cephalic size increase is indicated); lateral lobes normally broadly and heavily barred above with dark brown with ventral portion pale; even in the majority of darkest specimens traces of this pale ventral marking are evident. Abdomen normally brown with dark maculations and a narrow median line of darker shade. Limbs rather uniform in coloration tinged with reddish except in dark individuals. Caudal femora very heavy, heavier than in *lineatus;* spines of dorsal margins

MEASUREMENTS (IN MILLIMETERS) OF EXTREMES.

Male.	Length of Body.	Length of Pronotum.	Length of Tegmen.	Length of Caudal Femur.
Lakehurst, New Jersey	15	2.9	7.6	10.3
Cardiff, New Jersey	12	2.4	6.9	9.3
Goldsboro, North Carolina	10.8–11.2	2.0–2.3	3.6–4	7.1–7.8
Georgia. Type, *saussurei*	11.9	1.9	5.6	7.5
Clayton, Georgia	14	2.7	5.2	9.2
Billy's Island, Georgia	12.7	2.6	5.3	9.1
Crawford Co., Indiana	11.1	2	4.9	7.2
Wichita, Kansas	11.8–13.2	2.3–2.7	6.0–6.2	8.0–8.2
Washington Co., Texas	11.7–13.5	2.4–2.8	4.3–4.9	8.2–8.9
Beaumont, Texas	10.0–11.6	2.1–2.7	4.0–4.8	8.0–8.6
Vera Cruz, Mexico	11	2.1	3.9	6.8
Orizaba, Mexico	11.2	2	4.3	7.4
Independencia, Brazil	16	3.1	6.1	10.4
Igarapé Assu, Brazil	15.5	2.7	7.8	9.2
Carcaraña, Argentina	13.1–14	2.8–3	6.2–6.8	9.2–9.8
Mendoza, Argentina	14	2.9	5	9.1
Extremes of series	10.0–16	1.9–3.1	3.6–7.6	6.8–10.4

Female.	Length of Body.	Length of Pronotum.	Length of Tegmen.	Length of Caudal Femur.	Length of Ovipositor.
Washington, District of Columbia	15.	2.9	3.4	10.3	10
Falls Church, Virginia	12.5	2.7	3	9	8.8
Goldsboro, North Carolina	11.7–13.4	2.4–2.8	2.2–3.7	8.3–9.5	7.8– 8.6
Augusta, Georgia	15.1	2.9	3.1	9.9	10
Jacksonville, Florida	13.0–17.5	2.8–3.1	2.7–3.3	8.6–11	8.3–11.2
Crawford Co, Indiana	12.0–14.2	2.7–3	3.0–3.7	8.7–10	8.3–10.8
Washington Co., Texas	14	2.9	2.7	9	8.2
Beaumont, Texas	11.7–14.2	2.4–2.7	2.6–3.7	8.3– 9.4	8.5– 9.3
Cordoba, Mexico	12.7–13	2.4–2.6	7.1–7.2	8.9– 9.1	8.8– 9
Jalapa, Mexico	11	2.2	3	7.7	7.2
Vera Cruz, Mexico	11.2	2.1	2.3	7.4	7.2
Independencia, Brazil	15.3	3	2.9	10.1	9.7
Carcaraña, Argentina	12.5–16.2	2.9–3	3.1–3.9	10.0–10.6	10.2–10.8
Mendoza, Argentina	16.4	3.2	4	10.6	12
Extremes of series	11.0–17.5	2.1–3.2	2.2–4	7.4–11	7.2–12

of caudal tibiæ five in number, rarely six (in apparent rigidity, more closely approaching *Gryllus* than any other species of the present genus); the six distal spurs are also heavy.

A megacephalic condition similar to that found in *lineatus*, under which species we have discussed this feature, is also found in *verticalis*.

Of the material discussed above, the male from Igarapé Assu, Brazil, is macropterous, length of wing 19.9 mm., and also the females also from Cordoba, Mexico, length of wing 18.1–19.4 mm.

These series show a decided individual size variability with, however, little variation in proportions. A great amount of size variation appears to be due chiefly to local environmental conditions, but from our material the species does appear to average distinctly larger in temperate South America than in the United States; in the latter country no geographic size variation appears to exist, extremes being found almost indiscriminately.

From Nebraska to the Gulf coast of Texas, the extreme intensive type of coloration, in which particularly the males are almost uniform black (described as *oklahomæ*), is very frequently encountered; this type of coloration also appears occasionally in Georgia and Florida, but further north on the Atlantic coast this condition has not been found. Every conceivable intergradation between this and the normal type of coloration is found over the entire range of the species.

The most northern point at which the species has been found is Staten Island, New York. The material before us defines the further known distribution of the species, with the exception of a record from Paraguay by Giglio-Tos as "*G*[*ryllodes*] *saussurei*," and specimens recorded by that author as both *La Platæ* and *guyennensis* from Colonia Risso, Rio Apa, Paraguay, and under the last name from Villa Rica, Paraguay.

Specimens Examined.—122; 47 males, 60 females, 7 immature males and 8 immature females.

Lakehurst, New Jersey, VII, 12, 1908 (W. T. Davis), 1 ♂[12] [A. N. S. P.] (dk. megac.).[13]

Cardiff, N. J., VII, 28 to 31, 1914 (Hebard; trapped in molasses jar, in pine barrens), 1 ♂ [Hebard Cln.] (dk., mod. megac.).

Cape May, N. J., VII, 22, 1910 (Hebard), 1 juv. ♀ [Hebard Cln.].

Philadelphia, Pennsylvania, 1 juv. ♀ [A. N. S. P.].

College Park, Maryland, IX, 17, 1904 (A. N. Caudell), 1 ♀ [U. S. N. M.] (pl.).

Plummer's Island, Md., IV, 6, 1905 (W. L. McAtee), 1 ♀ [U. S. N. M.] (pl.).

Washington, District of Columbia, VI, 12, 1908, 1 ♀ [U. S. N. M.] (pl.).

Falls Church, Virginia, 1 ♂, 1 ♀ [U. S. N. M.] (♂ mod. dk., ♀ med. color).

Raleigh, North Carolina, VII, 8, 1903 (A. P. Morse), 1 ♂ [Morse Cln.].

Goldsboro, N. C., VII, 25, 1913 (Rehn and Hebard; undergrowth of pine woods), 3 ♂, 5 ♀, 1 juv. ♂, 1 juv. ♀ [Hebard Cln. and A. N. S. P.] (♂ dk., ♀ mod. dk.).

Columbia, South Carolina, VII, 28, 1913 (Hebard; edge of woods), 1 ♀ [Hebard Cln.] (mod. pl.).

Georgia, 2 ♂, type and paratype *saussurei* Scudder [M. C. Z.] (dk.).

Clayton, Ga., 2000–3700 ft., VI, 1909 (W. T. Davis), 1 ♂ [Davis Cln.] (dk. mod. megac.).

Sand Mountain, Ga., VII, 8, 1905 (A. P. Morse), 1 ♂, 2 ♀ [Morse Cln.].

Trenton, Ga., VII, 10, 1905 (A. P. Morse), 3 ♀, 1 juv. ♂ [Morse Cln.].

Augusta, Ga., VII, 29, 1913 (Hebard; undergrowth of short-leaf pine woods), 1 ♀ [Hebard Cln.] (med. color.).

Tybee Island, Ga., VIII, 13, 1903 (A. P. Morse), 1 ♂, 1 ♀ [Morse Cln.].

Macon, Ga., VII, 30 and 31, 1913 (Rehn and Hebard; undergrowth of short-leaf pine woods), 1 ♀ [Hebard Cln.] (mod. pl.).

Mixon's Hammock, Okeefenokee Swamp, Ga., VI, 16, 1912 (J. C. Bradley), 1 ♂ [Cornell Univ.] (v. dk.).

Billy's Island, Okeefenokee Swamp, Ga., VI and VII, 1912 (J. C. Bradley), 1 ♂, 3 ♀ [Cornell Univ.] (♂ v. dk., megac., ♀ mod. dk.).

Jacksonville, Florida (T. J. Priddey), 2 ♀, 1 juv. ♀ [Hebard Cln.].

Atlantic Beach, Fla., VIII, 24 and 25, 1911 (R. & H.; in sandy fields and 1 in "hammock tangle"), 1 ♂, 3 ♀ [Hebard Cln. and A. N. S. P.] (pl.).

Marianna, Fla., VIII, 7, 1903 (A. P. Morse), 2 ♂, 4 ♀ [Morse Cln.] (♂ v. dk., ♀ med. dk.).

Homestead, Fla., III, 17 to 19, 1910 (Hebard; rubbish about pothole), 1 juv. ♂, 1 juv. ♀;[12] VII, 10 to 12, 1912 (Rehn and Hebard; undergrowth in pine woods), 2 ♀, 1 juv. ♂ [all Hebard Cln. and A. N. S. P.] (med. color to mod. dk.).

Deep Lake, Fla., IV, 13, 1912 (W. T. Davis), 2 ♂[12] [Davis Cln. and A. N. S. P.] (v. dk.).

Key West, Fla., III, 15 and 16, 1910 (Hebard; under coquina boulders), 1 ♂, 1 ♀, 1 juv. ♂, 1 juv. ♀[12] [Hebard Cln.] (pl.).

Crawford County, Indiana, VI, 27 to VII, 7, 1899 to 1902 (W. S. Blatchley), 1 ♂, 5 ♀[12] [A. N. S. P. and Hebard Cln.] (♂ dk., ♀ pl. to med. color).

South Bend, Nebraska, VIII, 11, 1910 (L. Bruner), 1 ♂ [Hebard Cln.] (v. dk.).

Witchita, Kansas, VI, 4, 1904 (F. B. Isely), 3 ♂, 2 ♀[13] [U. S. N. M. and Hebard Cln.] (♂ v. dk., megac.).

Perkins, Oklahoma, V, 16, 1901 (Mrs. Nellie Caudell), 1 ♂, type *M. oklahomæ* Caudell [U. S. N. M.] (v. dk.).

Washington County, Texas, IV (L. Bruner), 4 ♂, 1 ♀ [Hebard Cln.] (♂ dk., megac., ♀ mod. dk.).

Tiger Mills, Tex., II, 1885 (F. G. Schaupp), 1 juv. ♀ [Hebard Cln.].

Beaumont, Tex., VII, 23, 1912 (Hebard; in wet grasses of pine forest), 7 ♂, 11 ♀ [Hebard Cln.] (♂ mod. dk., ♀ med. color to mod. dk.).

La Marque, Tex., VII, 22, 1912 (Hebard; under cow dung on prairie), 1 ♂ [Hebard Cln.] (mod. dk., mod. megac.).

Victoria, Tex., IV, 20, 1902 (W. E. Hinds), 1 juv. ♂ [U. S. N. M.].

Orizaba, Vera Cruz, Mexico, 1 ♂, 1 juv. ♂ [Hebard Cln.] (med. color).

Jalapa, V. C., Mex., VI, 1, 1894 (L. Bruner), 1 ♀ [Hebard Cln.] (mod. dk.).

Cordoba, V. C., Mex., IV, 24, 1908 (F. Knab), 2 ♀ [U. S. N. M.] (mod. dk., macropterous).

Vera Cruz, V. C., Mex., 1, 1892, ♂, 1 ♀ [Hebard Cln.] (pl.).

[12] This material has been previously recorded as *M. saussurei.*

[13] Recorded by Isely as *M. oklahomæ*, Trans. Kansas Acad. Sci., XIX, p. 248 (1905). Paler examples of his series were then recorded as *M. saussurei.* Interesting data as to appearance and habits are given.

Baturite Mountains, Ceará, Brazil (W. M. Mann), 1 ♂ [Stanford Univ.] (megac.).

Maranguape Mountains, Ceará, Brazil (W. M. Mann), 1 ♂ [A. N. S. P.] (megac.).

Independencia, Parahyba, Brazil (Mann and Heath), 1 ♂, 1 ♀ [A. N. S. P.] (♂ megac.).

Igarapé Assu, Pará, Brazil (H. S. Parish), 1 ♂ (med. color, macropterous).

Buenos Aires, Argentina (C. Lizer), 1 juv. ♀ [A. N. S. P.].

Carcaraña, Santa Fé, Argentina, 2 ♂, 2 ♀ [A. N. S. P.] (med. color.).

Mendoza, Argentina, II, 20, 1907 (Haarup), 1 ♂, 1 ♀ [Hebard Cln.] (♂ mod. pl., ♀ pl.).

NEW THYSANOPTERA FROM FLORIDA AND LOUISIANA.

By J. Douglas Hood and C. B. Williams

Washington, D. C.; Merton, Surrey, England.

The Thysanoptera described below were with the exception of one species collected in November and December, 1914, by Mr. C. B. Williams during a short trip in the Southern States to some of the field stations of the Bureau of Entomology, United States Department of Agriculture. Only a very little time could be spared for collecting, which was done in each place almost entirely within a short distance from the field stations, that at New Orleans being in connection with the Sugar Planters' Station in Audubon Park. The specimens of *Symphyothrips punctatus* were in the collection of the field station at Orlando. In all, eleven species and three genera are described as new.

The holotypes, allotypes, and a portion of the paratypes have been placed in the collection of Mr. Hood; a set of paratypes has been deposited in that of the American Museum of Natural History; and the balance of the material has been retained by Mr. Williams.

Bregmatothrips gracilis new species. (Plate VII., figs. 5 and 6.)

Female (macropterous).—Length about 1.2 mm. Color nearly uniform dark blackish brown, with pterothorax very slightly paler; legs yellow, with femora and tibiæ shaded with blackish brown; antennal segments 3–5, and apex of 2 and basal third of 6, lemon yellow.

Head about 1.1 times as long as wide, equal in length to prothorax; vertex swollen, produced anteriorly, broadly rounded as seen from above; dorsal surface faintly cross striate at base; interocellar bristles long, postocellars and postoculars shorter than in *venustus*. Eyes about .43 as long as head, protruding. Ocelli distant, forming an equilateral triangle, the two posterior ones opposite posterior third of eyes, the anterior smaller. Antennæ about 1.6 times as long as head; segments 7 and 8 more slender than in *venustus;* 1 and 2 slightly lighter than head, 2 paler toward apex and at middle; 3–5 pale lemon yellow; 6 yellow in basal third; remainder of antenna blackish brown; sense cones slender, simple; formula: 3, 0–1; 4, 0–1; 5, 1–0; 6, $1–1^{+1}$.

Prothorax slightly broader than long and about equal in length to head; posterior angles each with two long slender bristles; anterior angles with a pair of smaller, weaker bristles about equal in size to the posterior marginals and to a pair at the posterior third of the lateral margins; all other bristles minute. Mesothorax distinctly broader than prothorax and metathorax, which are subequal in width. Wings long, nearly transparent, slightly shaded with yellow; fore wings with two longitudinal veins reaching nearly to tip; anterior vein with 7 (rarely 6) pale bristles, of which two are usually near apex, three near base, and two at basal third; posterior vein with 6–8 bristles; hind wings slightly paler than fore wings. Legs rather short and stout; tarsi, fore tibiæ except for darkening near base externally, and mid and hind tibiæ in apical third, yellow; fore femora light, with an external dark area; mid and hind femora brown, becoming yellow at base.

Abdomen long, slender, sharply conical, the ninth segment fully 1.6 times as long as the tenth, which is divided above; bristles on 9 and 10 long, strong, dark in color, prominent.

Measurements of holotype: Length 1.21 mm.; head, length 0.144 mm., width 0.136 mm.; prothorax, length 0.144 mm., width 0.175 mm.; mesothorax, width 0.208 mm; metathorax, width 0.180 mm.; fore wing, length 0.672 mm., width 0.046 mm.; abdomen, width 0.244 mm.

Antennæ:	1	2	3	4	5	6	7	8
Length (μ)	17	33	36	30	30	52	10	14
Width (μ)	29	25	18	18	18	19	7	5

Total length, 0.222 mm.

Male (brachypterous).—Length about 1 mm. Color dark blackish brown, with pterothorax, first abdominal segment, legs, and intermediate antennal segments, lemon yellow; prothorax paler than head, fading posteriorly to ochraceous yellow.

Ocelli wanting. Femora and tibiæ with a narrow and faint shading of

brown along outer surface. Ninth abdominal segment not provided with two pairs of chitinous dorsal projections.

Otherwise similar to female.

Measurements of a male paratype: Length 0.948 mm.; head, length 0.130 mm., width 0.118 mm.; prothorax, length 0.132 mm., width 0.162 mm.; mesothorax, width 0.168 mm.; metathorax, width 0.163 mm.; abdomen, width 0.180 mm.

Antennæ:	1	2	3	4	5	6	7	8
Length (μ)	18	32	35	26	27	44	8	12
Width (μ)	25	22	15	15	15	16	7	5

Total length, 0.202 mm.

Described from 3 macropterous females and 9 apterous males, collected from grass at Orlando, Florida, November 5 and 8, 1914, by C. B. Williams.

This species is closely allied to *Bregmatothrips venustus* Hood, differing from it in the more slender form of the body, the longer head, and the differently colored and proportionately shorter antennæ. Specimens of the Javanese *B. binervis* (Kobus) are not available for comparison.

Merothrips fusciceps new species. (Plate VII., figs. 1–4.)

Female (macropterous).—Length about 1 mm. Color pale grayish brown, slightly more yellowish by reflected light; head and antennæ, except for second segment, darker; legs and second antennal segment grayish yellow; wings pale brown.

Head distinctly striate behind, 1.5 times as wide as long, broadest across the eyes; cheeks short and almost parallel; vertex rounded, with a pair of bristles longer than the first two antennal segments just anterior and mesad to the posterior ocelli; three pairs of small bristles between the eyes. Eyes large, three times as long as their distance from posterior margin of head, extending a little further back on the ventral surface; interval between the eyes about one and one-third times their width. Ocelli present, the anterior directed almost straight forward, the two posterior widely separated, placed at and contiguous with the front margin of the eye; ocellar pigment dark reddish brown. Antennæ almost three times the length of head, arising from its lower surface; segment 1 about half hidden in dorsal view by the overhanging vertex, short, cylindrical; 2 longer and very slightly wider than 1; 3 and 4 irregularly elliptical, with a transversely elongated, transparent sense area on the outer anterior margin; 5 small, subcircular; 6 and 7 subelliptical and almost equal in length; 8 tapering from the posterior third to a blunt point. Color grayish brown, except for segment 2 which is more transparent grayish yellow. Mouth cone rounded, about .84 as long as basal width; maxillary

palpi three-segmented, the basal segment very short and the middle segment much longer than the apical.

Prothorax weakly chitinized, the pronotum merging gradually both anteriorly and posteriorly with the connecting membrane, without any distinct line of division; pronotum separated from the pleural plate and the coxa by a longitudinal suture which is slightly concave laterally, surface with faint anastomozing lines of sculpture, a few scattered spines, and one long bristle at each posterior angle; width across coxæ about 1.9 times the width of the head; anterior coxæ with three distinct bristles arising from the ventral surface. Pterothorax wider than the prothorax, anterior angles rounded. Legs typical of the genus, stout, with fore and hind femora enlarged, the former nearly as wide as the head; fore tibiæ swollen anteriorly, with a stout tooth internally just before the apex; hind tibiæ with two strong spines on inner surface at apex, the upper longer and nearly half the length of the tarsus; anterior tarsi with a short curved hook at the apex. Fore wings bluntly pointed, tapering gradually to near apex, margins almost straight, about fourteen times as long as width at middle, with two longitudinal veins joined by a stouter cross vein about one-third the wing length from the base; both longitudinal veins and costa regularly set with moderately long, slender spines; in the unique specimen there are 30 and 29 on each costa, 21 and 23 on the fore veins, and 14 and 13 on the hind veins; the fringe on the anterior margin is long and rather sparse; the minute pubescence on the surface of the wing is almost obsolete. Hind wings similar in shape to fore wings, slightly shorter, and with a single very indistinct central vein represented chiefly by a rather deeper color.

Abdomen broad, blunt at apex, longitudinally striate near the lateral margins of the ventral surface; tenth segment faintly transversely striate above; spines weak except on the last two segments, the longest of these being about equal in length to the last three abdominal segments.

Measurements of holotype: Length 1.02 mm.; head, length 0.084 mm., width 0.121 mm.; prothorax, length uncertain, width (inclusive of coxæ) 0.228 mm.; pterothorax, width 0.242 mm.; wing, length 0.73 mm., width at middle about 0.052 mm.

Antennæ:	1	2	3	4	5	6	7	8
Length (μ)	12	33	37	35	21	24	24	25
Width (μ)	30	31	25	25	19	18	18	14

Total length, 0.220 mm.

Described from one female collected from an ornamental clump of bamboos in New Orleans, Louisiana, on December 1, 1914, by C. B. Williams.

This, the second described species of the remarkable family Merothripidæ, is particularly interesting as being the first macropterous specimen yet found; and for that reason the wings have been de-

scribed above very fully. They show in the almost complete absence of minute pubescence on the surface of the wing a departure from the normal Terebrantian type and some tendency toward that of the Tubulifera. The species can easily be distinguished from *Microthrips morgani* by the much shorter head, by the form of the antennal segments, by the stout tooth at the end of the fore tibiæ, which is as large in this female as in the male of *morgani,* and by the presence of distinct spurs on the hind tibiæ.

Haplothrips (?) bellus new species. (Plate VIII., figs. 2–5.)

Female (macropterous).—Length about 1.2 mm. Color dark blackish brown, hypodermal pigment red; femora and tibiæ slightly lighter, tarsi pale yellow; antennæ dark except for outer half of second, whole of third, and base of fourth segment.

Head a little more than 1.2 times as long as wide, cheeks very slightly converging behind; vertex slightly produced, the anterior ocellus overhanging; surface faintly sculptured, more distinctly behind, set with a few inconspicuous bristles; postocular bristles capitate, about as long as the eyes. Eyes small dorsally, only about one quarter the length of the head, rounded, not protruding; on ventral surface of head produced posteriorly in an acute angle about 1.3 times their dorsal length. Posterior ocelli opposite a line drawn behind anterior third of eyes. Antennæ about 1.6 times the length of head, slender; segment 1 about two-thirds as long as 2 and three-fourths as long as wide; 2*1* about 1.4 times as long as wide; 3 and 4 subequal and the longest; 5 and 6 successively shorter, nearly barrel-shaped, pedicellate; 7 oblong, briefly pedicellate, 1.9 times as long as wide; 8 about 1.4 times as long as wide and about three-fourths as long as 7; sense cones slender; formula: 3, I–I; 4, 2–2; 5, I–I+1; 6, I–I+1; 7 with one on dorsum near apex; color of 1 dark, slightly lighter than the head; 2 fading to light at apex, darker on inner surface; 3 light, shading slightly to apex; 4 dark except at base; rest very dark. Labium bluntly rounded, labrum just attaining its tip.

Prothorax .57 as long as the head and (inclusive of coxæ) about two and one-fourth times as long as wide; surface smooth, with median thickening near the middle; bristles capitate, except anterior marginals which are short and pointed; posterior laterals longest, about as long as postoculars; a few minute spines scattered over surface of pronotum. Pterothorax slightly narrower than prothorax, sides converging behind, fore angles sharply rounded. Wings not narrowed at middle, colorless, fringe sparse; fore wings without accessory bristles on posterior margin. Fore tarsi unarmed.

Abdomen about as wide as pterothorax. Tube half as long as head and about 1.8 times as long as the basal width, which is slightly more than twice the apical. Abdominal bristles pointed, brownish; terminal bristles about .8 as long as tube.

Measurements of holotype: Length 1.236 mm.; head, length 0.197 mm., width 0.160 mm.; prothorax, length 0.113 mm.; width (inclusive of coxæ) 0.252 mm.; pterothorax, width 0.240 mm.; abdomen, width 0.240 mm.; tube, length 0.099 mm.; width at base 0.057 mm., at apex 0.027 mm.

Antennæ:	1	2	3	4	5	6	7	8
Length (μ)	24	37	48	47	41	39	36	26
Width (μ)	32	27	26	25	20	22	19	11

Total length, 0.298 mm.

Male (macropterous).—Length about 1 mm. Fore femora sometimes enlarged (Plate —, figs. 4 and 5), fore tarsi with a stout straight tooth. Otherwise nearly as female.

Described from twenty females and four males collected from rushes at Orlando, Florida, November 8, 1914; two females from grass at the edge of a canal, Leesburg, Florida, November 16, 1914; and one female from rushes, Emeralda, Florida, November 17, 1914, —all taken by C. B. Williams.

This species finds its closest relative in *H.* (*?*) *tibialis* Hood, from Porto Rico, as shown by such characters as the production of the eyes on the ventral surface of the head and the narrow wings which are scarcely narrowed at middle. The coloration of the legs is the most readily observed character for their separation.

Zygothrips bicolor new species. (Plate VIII., figs. 6 and 7.)

Female (macropterous).—Length about 1.5 mm. Color: head, thorax, abdominal segments 9 and 10, and basal two-thirds of fore femora dark brown, segments 1, 7, and 8 of antennæ slightly paler; abdomen, middle and hind legs, and the tarsus, tibia, and apex of femur of fore legs, and antennal segments 2–6, pale yellow.

Head about 1.4 times as long as wide, broadest about half way back, narrowing slightly to apex and base, vertex rounded and evenly declivous; a few striæ near posterior margin; postocular bristles long and capitate. Eyes about .28 as long as head, very slightly protruding. Anterior ocellus directed forward; posterior pair opposite anterior third of eyes. Antennæ about 1.7 times as long as head; segment 1 short, tapering slightly from base; 2 the widest, subglobose, constricted near base; 3 and 4 almost equal in width; 5–8 successively narrower; 7 longer than 4; 8 subconical, broadly united to 7; sense cones very weak and transparent, barely visible. Mouth cone blunt, much shorter than the width of the head, barely reaching middle of prosternum; tip of labrum just attaining tip of labium.

Prothorax about as long as width of head and (inclusive of coxæ) about 1.9 times as wide as long; anterior marginal bristles wanting or exceedingly minute;

all others present, moderately long, conically expanded at tip; posterior laterals longest, distinctly longer and stouter than the posterior marginals. Pterothorax not quite as wide as the prothorax, sides converging behind. Fore wings slightly constricted in the middle where there is in mounted specimens a slight folding of the surface; transparent at base and apex, faintly clouded with brown in the middle; 1 to 4 accessory hairs on the posterior margin (thirteen counts gave 1 three times, 2 three times, 3 five times, 4 twice); hind wings with similar fold in middle, almost colorless. Fore tarsi armed with a strong curved tooth, from the base of which arises two spines about equal in length to it.

Abdomen normal; lateral bristles pale and slender, some capitate (Plate VIII, fig. 7). Tube about half as long as head, not twice as long as basal width, and rather less than twice as broad at base as at apex; terminal bristles brown, almost twice as long as tube.

Measurements of holotype: Length 1.51 mm.; head, length 0.192 mm.; width 0.138 mm.; prothorax, length 0.135 mm., width (inclusive of coxæ) 0.258 mm.; pterothorax, width 0.237 mm.; abdomen, width about 0.29 mm.; tube, length 0.099 mm., width at base 0.059 mm., at apex, 0.031.

Antennæ:	1	2	3	4	5	6	7	8
Length (μ)	24	39	54	47	44	40	49	28
Width (μ)	30	29	26	27	24	22	19	13

Total length of antenna, 0.325 mm.

Described from eight females, all from Florida, as follows: Orlando, November 5, 1914, one female taken on an undetermined plant (possibly *Mimosa*), and three females from Spanish moss on pine tree; Orlando, November 6, 1914, two females from bamboo; Orlando, November 8, 1914, one female from rushes; Emeralda, November 17, 1914, one female from rushes.

Immediately separable from all known species by the color, all other described forms of the genus being uniformly either dark or light.

Zygothrips pullus new species. (Plate VIII., fig. 1.)

Female (macropterous).—Length about 1.5 mm. Color dark brown, with tarsi, tibiæ, apex of fore femora, and third antennal segment lighter; tube darker at base than at apex.

Head about one and one-third times as long as wide, broadest at basal third, thence gradually narrowing to eyes and to base, more rapidly in the latter direction; postocular bristles as long as eyes, capitate. Eyes about one-fourth as long as head, not protruding. Anterior ocellus directed straight forward; posterior ocelli opposite anterior third of eyes. Antennæ about 1.75 times as long as head, rather stout; segment 1 broader than long; 2

longer but not so broad; 3 slightly longer and narrower than 2; 4 the longest, broader than either 3 or 5; 5 slightly longer than 6, which is about as long as segment 3; 8 conical, distinctly more than half as long as 7; color: 1 almost black; 2 slightly lighter toward apex; 3 much lighter, especially toward base; remaining segments successively darker to 8, which is almost as dark as 1. Mouth cone blunt, much shorter than width of head, reaching about to middle of prosternum; labrum about attaining tip of labium.

Prothorax longer than width of head and (inclusive of coxæ) nearly 1.8 times as wide as long; surface smooth; anterior marginal bristles wanting or minute, others present, conically expanded at tip, posterior laterals longest, about as long as postoculars. Pterothorax slightly narrower than prothorax, sides converging posteriorly. Legs of moderate length, fore femora moderately stout, fore tarsus with strong, curved tooth, from the base of which arises two spines about equal in length to tooth; color dark brown, with tarsi, apex of mid and hind tibiæ and the fore tibiæ, especially at each end, lighter. Wings almost colorless, slightly narrower about two-fifths from base, where there is a slight folding of the surface; 1–5 (usually 3) accessory hairs.

Abdomen normal; spines rather short and pale, arranged in *Z. bicolor* (Plate VIII, fig. 7), but with the dorsal pair at apex of segment 9 short and capitate, and the terminal bristles fully twice as long as tube. Tube .6 as long as head, about twice as long as basal width, not quite twice as broad at base as at apex.

Measurements of holotype: Length 1.55 mm.; head, length 0.205 mm.; width 0.156 mm.; prothorax, length 0.180 mm., width (inclusive of coxæ) 0.322 mm.; pterothorax, width 0.312 mm.; abdomen, width 0.336 mm.; tube, length 0.123 mm., width at base 0.064 mm., at apex 0.036 mm.

Antennæ:	1	2	3	4	5	6	7	8
Length (μ)	24	42	44	54	47	45	48	29
Width (μ)	36	30	28	30	26	22	19	12

Total length, 0.333 mm.

Described from 32 females collected from bamboo, sago palm, and live oak covered with Spanish moss, at New Orleans, Louisiana, December 1 and 2, 1914, by C. B. Williams.

Distinguished by the long prothorax, the peculiar tarsal tooth, the long bristles at the apex of the tube, and the nearly uniform dark color.

Trichothrips marginalis new species. (Plate IX., fig. 1.)

Female (brachypterous).—Length about 1.8 mm. Color yellowish brown, with head, prothorax, and terminal abdominal segments darkened with blackish brown; segment 1 of antennæ concolorous with head, 2 lighter toward apex, 3 light yellowish brown, 4 shading to darker at tip, 5 dark in outer

three-fifths, 6 yellow in basal third, remainder of antenna dark blackish brown; legs about concolorous with body, the tibiæ and tarsi somewhat lighter; hypodermal pigment orange yellow.

Head slightly longer than wide, broad in front, sides converging from just outside eyes to back of head, occipital region distinctly subreticulate and with a few minute spines; postocular bristles almost half as long as head, pointed. Eyes small, directed forward, external margin (in dorsal view) only about one-fifth the length of the head. Anterior ocellus directed slightly forward, the two posterior ones small and opposite anterior third of eyes. Antennæ a little more than twice the length of the head; segment 1 large and slightly tapering to apex; 2 longer and narrower than 1; 3 the longest, subconical; remaining segments successively shorter and narrower; 7 pedicellate; 8 lanceolate, pedicellate; sense cones: 3, 1–2; 4, 2–2; 5, 1–1+1; 6, 1–1+1; 7 with one on dorsum near apex. Mouth cone reaching about two-thirds across prosternum; labrum slightly surpassing labium.

Prothorax about .95 as long as head and (inclusive of coxæ) about 1.9 times as wide as long; anterior marginal bristles very short; others distinct, pointed, the three posterior pairs subequal, fully as long as postoculars and about twice as long as anterior laterals; coxal bristle about equal in length to anterior lateral. Pterothorax slightly narrwer than prothorax, sides almost parallel. Wings reduced to small pads. Fore tarsus with a stout, straight tooth.

Abdomen normal, slightly wider than prothorax. Tube about .85 as long as head, about 2.3 times as long as basal width and more than twice as broad at base as at apex. Bristles long and pointed, those on the ninth segment almost as long as the tube; terminal bristles two-thirds the length of tube.

Measurements of holotype: Length 1.84 mm.; head, length 0.233 mm., width 0.221 mm.; prothorax, length 0.223 mm., width (inclusive of coxæ) 0.420 mm.; pterothorax, width 0. 386 mm.; abdomen, width 0.462 mm.; tube, length 0.204 mm., width at base 0.087 mm., at apex 0.039 mm.

Antennæ:	1	2	3	4	5	6	7	8
Length (μ)	51	57	73	65	63	60	53	50
Width (μ)	48	39	43	44	39	35	30	20

Total length, 0.472 mm.

Male (brachypterous).—Smaller than female (length about 1.7 mm.). Prothorax twice as broad as long; abdominal spines, except for terminal ones, slightly shorter.

Nymphs.—Orange yellow.

Described from 3 females, 2 males, and 20 nymphs of various stages taken under the bark of a willow tree in New Orleans, Louisiana, December 2, 1914, by C. B. Williams.

The principal diagnostic characters of this species are the form of

the head, the pedicellate eighth antennal segment, the reduced anterior marginal bristles, and the color.

Trichothrips terminalis new species. (Plate IX., fig. 2.)

Female (brachypterous).—Length about 1.9 mm. Color brown; head, apical abdominal segments, and legs except for basal half of mid and hind femora, nearly yellow; antennæ at base concolorous with head, gradually darker to segment 5 which, with 6–8, is blackish brown. Hypodermal pigmentation bright carmine.

Head slightly longer than wide, truncate in front, constricted behind to within a short distance of the hind margin, thence slightly widened; posterior part with faint anastomozing lines of sculpture and a few short, stout pines; postocular bristles about half the length of head. Eyes small, external margin only equal to one-fourth the length of the head. Ocelli present but indistinct, the anterior one directed forward, the two posterior just in front of the middle of the eye. Antennæ slightly more than twice the length of the head; segment 1 long, slightly tapering; 2 longer and narrower; 3 the longest, widest in its apical fourth, wider than 2; 4–7 subclavate, 8 distinctly separated from 7 and with a broad pedicel; sense cones: 3, 1–2; 4, 2–2; 5, $1–1^{+1}$; 6, $1–1^{+1}$; 7 with one on dorsum near apex. Mouth cone rounded, reaching about half way across the prosternum; labrum slightly surpassing labium.

Prothorax about .84 as long as head and (inclusive of coxæ) about 2.4 times as wide as long; all usual bristles present, pointed; posterior laterals about as long as postoculars; anterior laterals and anterior marginals about half as long; 5 coxal bristles, the anterior being fully three times as long as the others and equal in length to the anterior laterals. Pterothorax narrower than prothorax, sides irregular but more or less arcuate. Wings reduced to very small pads. Fore tarsus with a stout, slightly curved tooth.

Abdomen large. Tube .8 the length of head, twice as long as basal width, and slightly more than twice as wide at the base as at the apex; color yellow, tipped with gray. Terminal bristles brown, the longest about three-fourths the length of the tube; other abdominal bristles yellow.

Measurements of holotype: Length 1.88 mm.; head, length 0.228 mm., width 0.223 mm.; prothorax, length 0.192 mm., width (inclusive of coxæ) 0.456 mm.; pterothorax, width 0.432 mm.; abdomen, width 0.541 mm.; tube, length 0.182 mm., width at base 0.09 mm., at apex 0.044 mm.,

Antennæ:	1	2	3	4	5	6	7	8
Length (μ)	48	55	70	63	63	59	49	50
Width (μ)	48	36	42	39	39	34	27	20

Total length, 0.457 mm.

Male (brachypterous).—Slightly smaller than female (length about 1.6 mm.). Coloration similar. Prothorax distinctly longer than the head and (inclusive of coxæ) twice as wide as long. Median line heavily chitinized in basal five-eighths. Fore tarsal tooth stout, triangular.

Described from 8 females and 4 males collected from the stump of an undetermined tree (bay?) in a damp situation near Orlando, Florida, on November 15, 1914, by C. B. Williams.

Easily recognized by the yellow head and apical abdominal segments.

SYMPHYOTHRIPS new genus.

(*συμφύα*, a *ω* growing together; *θρίψ*, a wood worm.)

Head about as wide as long, vertex evenly declivous, cheeks nearly smooth, sub-parallel. Eyes small or moderate, their interval greater than their width. Antennæ seven-segmented, though sometimes with a more or less distinct suture across the last segment, indicating the line of fusion. Mouth cone very long, pointed, attaining middle of mesosternum, tip of labrum exceeding that of labium; maxillary palpi long, slender, about one-third the length of head, basal segment very short; labial palpi about half as long as maxillary palpi. Pronotum slightly shorter than head, of normal structure. Fore femora slightly enlarged, fore tarsi with a stout tooth in both sexes. Wings, when present, moderately broad, not narrowed at middle. Abdomen moderately heavy; tube stout, very thickly chitinized, nearly as long as head and half as broad, much narrowed to apex; lateral abdominal bristles, especially those on apical segments, unusually stout.

Type.—*Symphyothrips punctatus* Hood and Williams.

Though evidently a close relative of *Trichothrips,* this genus would appear distinct by the union of the seventh and eighth antennal segments to form a compact mass, and by the stout, heavily chitinized tube.

Symphyothrips punctatus new species. (Plate IX., figs. 3–6.)

Female, *forma macroptera.*—Length about 1.7 mm. Color uniform yellowish brown, except for tube, which is orange brown, and a pair of nearly black blotches at base of abdominal tergites 3–8; wings pale yellowish brown; hypodermal pigment orange by reflected light, ocellar pigment bright red.

Head slightly longer than wide, blunt anteriorly, sides slightly converging behind, occipital region faintly reticulate; postocular bristles as long as the eye, capitate, stout. Eyes small, one-fifth the length of the head. Ocelli distinct, the anterior one directed slightly forward, the three forming an equilateral triangle with the base on a line with the back of the eyes. Antennæ about 1.8 times the length of the head; segment 1 tapering to apex; 2 longer and narrower; 3 subconical, rounded at the apex; 4–6 suboval, pedicellate; 7 with very indistinct trace of division about two-fifths from apex; 6 and 7 a little darker than the rest, which are concolorous with the body; sense cones long, slender; formula: 3, 1–1; 4, $1–1^{+1}$; 5, $1–1^{+1}$; 6, $1–0^{+1}$; 7 with one at apical two-fifths of dorsal surface.

Prothorax .8 as long as head and (inclusive of coxæ) twice as long as broad; all usual bristles present, capitate, subequal in length, about as long as the postoculars. Pterothorax slightly wider than prothorax, widest at middle, thence converging slightly to each end. Legs stout, concolorous with body; fore tarsus with stout tooth. Wings pale yellowish, broad, about ten times as long as the breadth at middle, not constricted; 4–6 accessory hairs on the hind margin of fore wing.

Abdomen large, a little wider then pterothorax; dorsal bristles capitate, ventral laterals pointed, all terminal bristles pointed. Tube very heavy, .84 as long as head and only half again as long as the basal width, which is 3.7 times the apical; surface covered with several irregular rows of small seta-bearing warts; terminal bristles short, about half the length of the tube.

Measurements of holotype: Length 1.68 mm.; head, length 0.228 mm., width 0.216 mm.; prothorax, length 0.180 mm., width (inclusive of coxæ) 0.362 mm.; pterothorax, width 0.372 mm.; abdomen, width 0.432 mm.; tube, length 0.192 mm., width at base 0.125 mm., at apex 0.034 mm.

Antennæ:	1	2	3	4	5	6	7
Length (μ)	42	54	63	57	51	49	74
Width (μ)	45	37	37	37	36	33	28

Total length, 0.390 mm.

Female, forma brachyptera.—Apart from the reduction of wings and pterothorax, and a slight reduction in the size of the eyes, this form does not differ from the fully winged one. The ocelli with their red pigment are quite distinct.

Male (brachypterous).—Smaller than the female (length 1.4 mm.). Fore femora slightly more swollen and tarsal tooth larger. Prothorax only 1.8 times as broad as long.

Measurments of allotype: Length 1.38 mm.; head, length 0.192 mm., width 0.176 mm.; prothorax, length 01.80 mm., width (inclusive of coxæ) 0.329 mm.; pterothorax, width 0.306 mm.; abdomen, width 0.372 mm.; tube, length 0.186 mm., width at base 0.110 mm., at apex 0.036 mm.

Antennæ:	1	2	3	4	5	6	7
Length (μ)	39	51	60	53	50	48	75
Width (μ)	45	35	33	34	33	30	27

Total length, 0.376 mm.

Described from 4 macropterous females, 4 brachypterous females, and 4 brachypterous males taken "in body of orange tree," Orlando, Florida, January 21, 1913, by W. W. Yothers.

This species comes nearest to *Trichothrips anomocerus* Hood but may be separated from this by the much more swollen tube, the almost complete fusion of the seventh and eighth antennal segments, the

capitate form of the bristles, the presence of the anterior marginal pair on the prothorax, the small warts on the tube, and the six pairs of black abdominal spots.

GNOPHOTHRIPS new genus.

(γνόφος, darkness; θρίψ, a wood worm.)

Head much longer than wide and much longer than prothorax; vertex rounded, slightly produced, bearing the anterior ocellus at its extremity; cheeks smooth, arcuate to eyes and base of head. Eyes small (in the single known species about one-fifth the length of head), not at all protruding, inconspicuous. Ocelli anterior in position. Antennæ eight-segmented, the last two segments closely, but not compactly, joined. Mouth cone nearly attaining mesosternum; labium rounded, scarcely surpassed by labrum. Prothorax much shorter than head, bristles short. Fore tarsi unarmed in both sexes. Wings reduced in the only known species. Abdominal segments short, those near base about four times as wide as long. Tube about half as long as head.

Type.—Gnophothrips megaceps Hood and Williams.

It must be said that this genus is a rather weakly defined one, approaching *Liothrips* very closely in nearly all details of structure, such as the produced vertex, the more or less united character of segments 7 and 8 of the antennæ, and the unarmed fore tarsi of both sexes. Its separation is based principally on the reduced wings,—wing dimorphism is unknown in *Liothrips*,—the transverse abdominal segments, the short prothoracic bristles, and the small, non-protruding eyes.

Gnophothrips megaceps new species. (Plate X., figs. 1 and 2.)

Female (brachypterous).—Length about 1.7 mm. Color black, with thorax slightly lighter; tarsi brown; antennæ beyond segment 2 ochraceous yellow, darkened with brown apically.

Head about 1.3 times as long as greatest width, broadest at middle, sides converging roundly to eyes and base of head; vertex rounded, slightly produced; cheeks nearly smooth, with a few minute bristles; postocular bristles short and blunt. Eyes about one-fifth as long as head and not at all protruding, slightly narrower than their interval. Ocelli forming an equilateral triangle; anterior ocellus overhanging, posterior ocelli slightly in front of middle of eyes. Antennæ about 1.3 times as long as head, form and structure well shown in Figure 2, Plate —; sense cones small, formula: 3, 0–1; 4, 1–2; 5, $1–1^{+1}$; 6, $1–1^{+1}$; 7 with 1 on dorsum near apex; segments 1 and 2 nearly concolorous with head, 2 paler at midle of apex; 3–6 ochraceous yellow, 5 slightly infuscate apically, 6 brownish in apical half; 7 yellow in basal third, remainder of antenna brown.

Prothorax about .57 as long as head and (inclusive of coxæ) twice as wide as long; all bristles present, unusually short, blunt. Pterothorax about equal in width to prothorax, sides nearly parallel. Wings colorless, equal in length to head. Fore tarsi unarmed.

Abdomen slightly wider than prothorax. Tube about .54 as long as head and twice as long as basal width, which is about twice the apical. Abdominal bristles moderately long, brown, mostly blunt, terminal ones nearly as long as tube.

Measurements of holotype: Length 1.68 mm.; head, length 0.312 mm., width 0.236 mm.; prothorax, length 0.180 mm., width (inclusive of coxæ) 0.362 mm.; pterothorax, width 0.372 mm.; abdomen, width 0.432 mm.; tube, length 0.162 mm., width at base 0.081 mm., at apex 0.039 mm.

Antennæ:	1	2	3	4	5	6	7	8
Length (μ)	36	54	63	63	57	59	49	30
Width (μ)	39	35	31	35	34	35	27	15

Total length, 0.411 mm.

Male (brachypterous).—Length 1.39 mm. Head about 1.45 times as long as greatest width; antennæ about 1.47 times as long as head, all of the intermediate segments infuscate apically; wings about 1.3 times as long as head; fore tarsi unarmed. Otherwise similar to female.

Measurements of allotype: Length 1.39 mm.; head, length 0.276 mm., width 0.190 mm.; prothorax, length 0.144 mm., width (inclusive of coxæ) 0.302 mm.; pterothorax, width 0.288 mm.; abdomen, width 0.305 mm.; tube, length 0.141 mm., width at base 0.072 mm., at apex 0.032 mm.

Antennæ:	1	2	3	4	5	6	7	8
Length (μ)	30	48	66	63	57	58	50	33
Width (μ)	34	30	29	31	30	29	24	13

Total length, 0.405 mm.

Described from one female and one male collected from a tree stump at Emeralda, Florida, November 17, 1914, by E. B. Williams.

BARYTHRIPS new genus.

($\beta\alpha\rho\iota\varsigma$, heavy; $\theta\rho\iota$, a wood worm.)

Body stout and thick, smooth. Head rectangular, longer than wide, vertex evenly declivous, cheeks straight, smooth. Eyes moderately small, subquadrangular. Antennæ slender, eight-segmented, intermediate segments elongate, the last two segments rather closely, but not compactly, joined. Mouth cone reaching about to middle of prothorax, broadly rounded at apex, tip of labrum scarcely attaining that of labium; maxillary palpi half as long as labrum, two segmented, basal segment short; labial palpi papilliform. Pronotum (at least in the male) distinctly longer than head, with prominent

median thickening; outer pair of bristles at posterior angles very long. Fore femora swollen in the male and fore tarsi strongly toothed. Abdomen about as wide as prothorax, all bristles very long and prominent; tube shorter than the head, very stout, basal width three times the apical and three-fourths the length.

Type.—*Barythrips sculpticauda* Hood and Williams.

This genus suggests *Cryptothrips, Diceratothrips, Dichætothrips, Trybomia,* and *Eurynothrips* in certain points of structure. The long prothorax distinguishes it at once from all except *Eurynothrips,* which differs in having the mouth cone slender with long labial and maxillary palpi, rounded eyes, irregular cheeks, short bristles, and the pronotum more than twice as long as the head. *Trybomia,* a South American genus with a pair of stout, forwardly-directed anteocular bristles and a very short prothorax, is the only one of the above genera with the tube much shorter than the head.

Barythrips sculpticauda new species. (Plate X., fig. 3.)

Male (apterous).—Length about 1.8 mm. Color dark brown, almost black, head and thorax distinctly lighter than abdomen; mid and hind femora yellow, with a black blotch externally near the base; fore femora dark brown at base, fading to ochraceous at the apex; fore tibiæ and all tarsi brownish yellow, middle and hind tibiæ blackish brown. Antennal segments 1 and 2 nearly white; 3 and 4 slightly darker, nearly black in *basal* half; 5 still darker, shaded with gray, black in basal third; 6–8 black.

Head 1.1 times as long as wide, broad in front, sides parallel, vertex rounded, surface without sculpture; postocular bristles more than one-third the length of the head. Eyes small, directed forward, about one-fifth as long as the head. Ocelli wanting. Antennæ 1.9 times the length of the head; segment 1 broad; segment 2 longer and narrower; 3–6 clavate, pedicellate; 8 two-thirds as long as 7, conical; sense cones: 3, 0–1; 4, 1–2; 5, $1–1^{+1}$; 6, $1–0^{+1}$; 7 with one on dorsum near apex.

Prothorax about 1.25 times as long as head and (inclusive of coxæ) about 1.7 times as wide as long; all bristles brown, pointed; anterior marginal bristles long and slender; anterior laterals short; midlaterals about half as long as posterior marginals, which are about as long as postoculars; posterior laterals very long, twice as long as the posterior marginals. Pterothorax narrower than the prothorax, sides parallel. Fore legs large, swollen, with large tarsal tooth.

Abdomen large and broad, with long black spines on the posterior margins of the tergites. Tube very broad and heavy, about two-thirds as long as head, 1.3 times as long as basal width, fully three times as wide at base as at apex, with several deep longitudinal grooves.

Measurements of holotype: Length 1.79 mm.; head, length 0.240 mm., width 0.216 mm.; prothorax, length 0.304 mm., width (inclusive of coxæ) 0.525 mm.; pterothorax, width 0.468 mm.; abdomen, width 0.588 mm.; tube, length 0.159 mm., width at base 0.123 mm., at apex 0.038 mm.

Antennæ:	1	2	3	4	5	6	7	8
Length (μ)	30	60	81	75	69	69	48	34
Width (μ)	42	39	34	36	33	30	23	16

Total length, 0.466 mm.

Described from one male collected from a pine stump at Orlando, Florida, November 5, 1914, by C. B. Williams.

This species is particularly noticeable because of the unusual coloration of the third to fifth antennal segments, which are very dark at the base and lighter in the apical portions. It is the only known North American species with a grooved tube.

Polyphemothrips tibialis new species. (Plate X., figs. 4, 5.)

Male (macropterous).—Length about 2.1 mm.; width of pterothorax 0.43 mm. Color dark brown with reddish brown hypodermal pigment; tarsi, tibiæ, and apices of femora pale yellow; segments 1, 2, and 3 of antennæ yellow, 3 slightly darker at apex, rest of antenna dark; tube orange brown in basal two-thirds.

Head about 1.5 times as long as width at base, prominently elevated, widest behind eyes, vertex only very slightly overhanging base of antennæ; cheeks abruptly swollen on ventral lateral margin just behind eyes, thence very slightly converging to basal three-tenths, and widening again at base, the relative widths of the head at these points being in the relation 20.3: 18.2: 19; postocular bristles capitate, slightly longer than the eye. Eyes about one quarter as long as the head, abruptly protruding, lateral margins flattened posteriorly. Ocelli moderately large, approximate, anterior ocellus situated on extreme vertex, posterior ocelli on line with front margin of eyes. Antennæ inserted on the ventral surface, seven-segmented, 1.7 times as long as the head; segments 1 and 2 shortest, 2 distinctly longer than 1; 3–6 claviform, but distinctly shorter and broader than in *corticis*; 7 fusiform, truncate at base, with very indistinct and partly incomplete suture two-fifths of length from apex. Color of antennæ: segments 1 and 2 pale transparent yellow; 3 similar at base but distinctly darker at apex; 4–7 dark brown. Sense cones long and slender; formula: 3, 1–2; 4, 2–2; 5, 1–1; 6, 1–1; 7 with one at middle of dorsal surface; there are several small rudimentary cones on 4 and one each on 5 and 6. Labium very broadly rounded, truncate, reaching about three-fourths across the prosternum.

Prothorax along median dorsal line about 0.49 as long as head and (inclusive of coxæ) about 2.7 times as wide as long, all usual bristles present,

all capitate, posterior marginals and posterior angulars longest and subequal, the rest slightly shorter and subequal. Pterothorax slightly narrower than prothorax, sides slightly converging posteriorly. Wings long, about 12 times as long as broad, uniform pale brown; hind margin of fore wing with 13–15 accessory hairs. Legs slender; fore femur longer than basal width of head; fore tarsi with a stout tooth; femora dark brown, much lighter at tips; all tibiæ and tarsi, except for a dark spot on the latter, pale yellow.

Abdomen normal, a little narrower than the pterothorax. Tube 0.76 as long as head and slightly more than twice as broad at base as at apex; abdominal bristles pale in color, long, pointed (except for two capitate bristles on each side of the eighth segment), those on segment 9 longer than the tube; terminal bristles as long as the tube, dark in color.

Measurements of holotype: Length 2.06 mm.; head, length 0.343 mm., width behind eyes 0.247 mm.; prothorax, length 0.168 mm., width (inclusive of coxæ) 0.444 mm.; pterothorax, width 0.432 mm.; abdomen width 0.372 mm.; tube, length 0.261 mm., width at base 0.101 mm., at apex 0.048 mm.

Antennæ:	1	2	3	4	5	6	7
Length (μ)	51	69	90	89	75	72	88
Width (μ)	39	37	44	45	41	33	29

Total length, 0.534 mm.

Described from one male collected from a low privet hedge in New Orleans, Louisiana, on December 1, 1914, by C. B. Williams.

This species may immediately be distinguished from the two known species of its genus by the yellow tibiæ, the light color of the first two antennal segments, and by the relatively stouter and shorter antennæ.

EXPLANATION OF PLATES.

(J. D. H. del., camera lucida.)

PLATE 7.

Fig. 1. *Merothrips fusciceps* n. sp. Segments 7–10 of abdomen, female, holotype.

Fig. 2. *Merothrips fusciceps.* Left fore wing, female, holotype.

Fig. 3. *Merothrips fusciceps.* Right antenna, female, holotype.

Fig. 4. *Merothrips fusciceps.* Head and prothorax, female, holotype.

Fig. 5. *Bregmatothrips gracilis* n. sp. Head and prothorax, female, holotype.

Fig. 6. *Bregmatothrips gracilis.* Left antenna, female, holotype.

PLATE 8.

Fig. 1. *Zygothrips pullus* n. sp. Head and prothorax, female, holotype.

Fig. 2. *Haplothrips (?) bellus* n. sp. Head and prothorax, female, holotype.

Fig. 3. *Haplothrips (?) bellus.* Ventral surface of head, female, holotype.

Fig. 4. *Haplothrips (?) bellus.* Right fore leg, male, paratype.

Fig. 5. *Haplothrips (?) bellus.* Right fore leg, male, allotype.

Fig. 6. *Zygothrips bicolor* n. sp. Head and prothorax, female, holotype.

Fig. 7. *Zygothrips bicolor.* Segments 7–10 of abdomen, female, paratype.

PLATE 9.

Fig. 1. *Trichothrips marginalis* n. sp. Head and prothorax, female, holotype.

Fig. 2. *Trichothrips terminalis* n. sp. Head and prothorax, female, holotype.

Fig. 3. *Symphyothrips punctatus* n. gen. and n. sp. Head and prothorax, female, holotype.

Fig. 4. *Symphyothrips punctatus.* Right fore leg, female, paratype.

Fig. 5. *Symphyothrips punctatus.* Inner surface of left antenna, female, paratype.

Fig. 6. *Symphyothrips punctatus.* Segments 7–10 of abdomen, female, paratype.

PLATE 10.

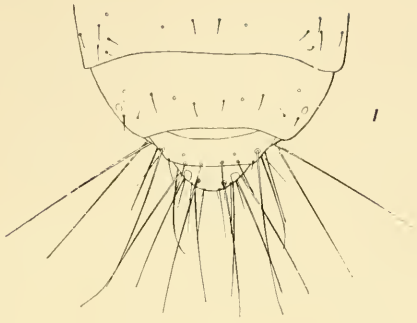
Fig. 1. *Gnophothrips megaceps* n. gen. and n. sp. Head and prothorax, female, holotype.

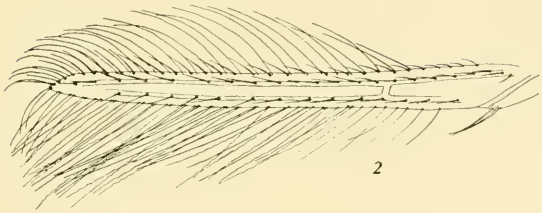
Fig. 2. *Gnophothrips megaceps.* Right antenna, female, holotype.

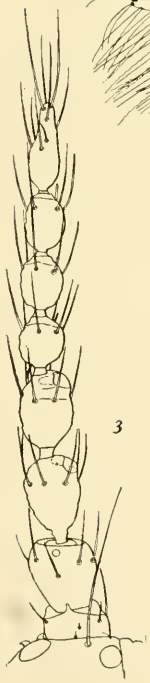
Fig. 3. *Barythrips sculpticauda* n. gen. and n. sp. Head and prothorax, male, holotype.

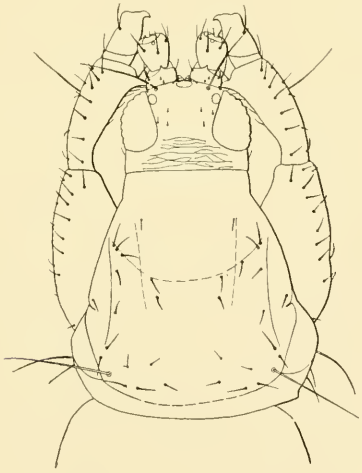
Fig. 4. *Polyphemothrips tibialis* n. sp. Head and prothorax, male, holotype.

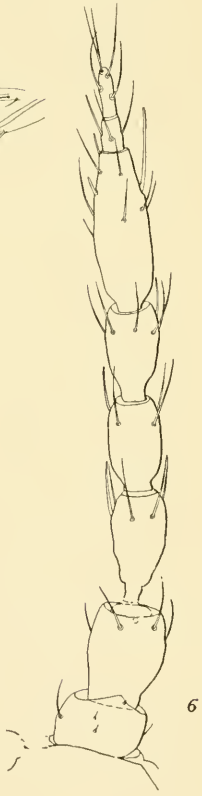
Fig. 5. *Polyphemothrips tibialis.* Tip of right antenna, male, holotype,











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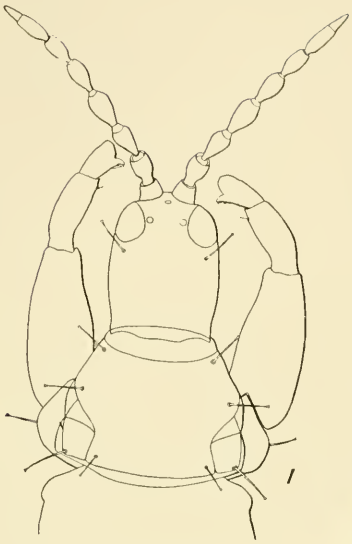

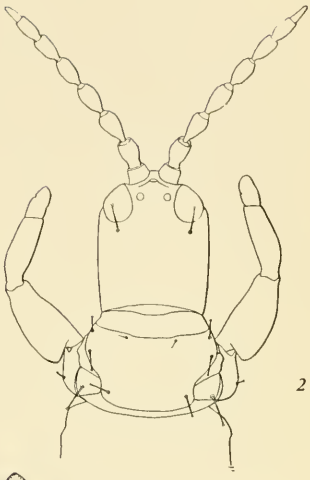

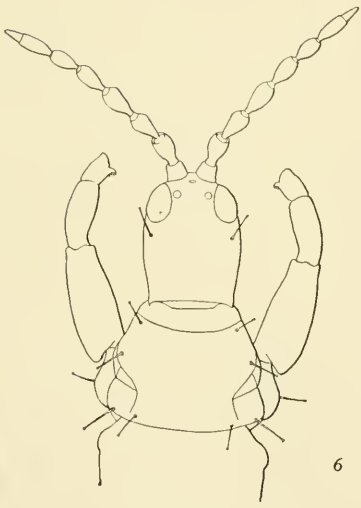

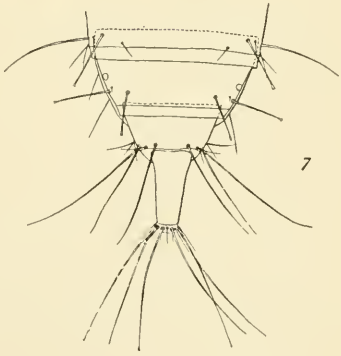

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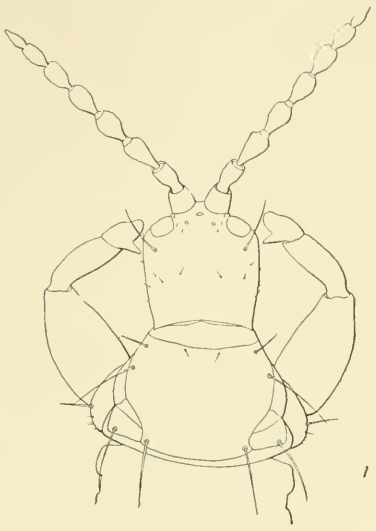
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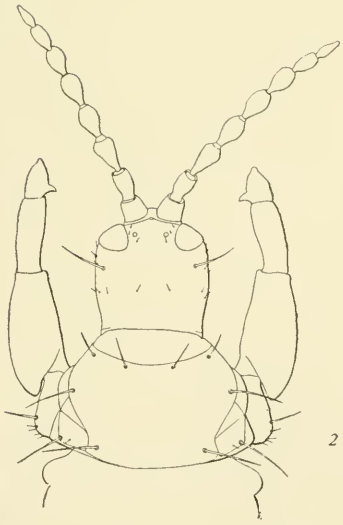
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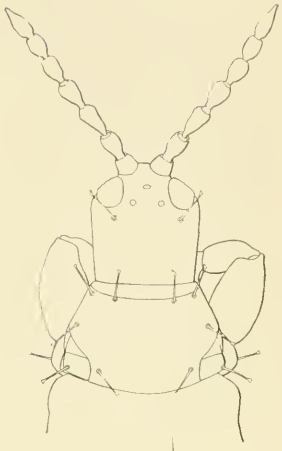
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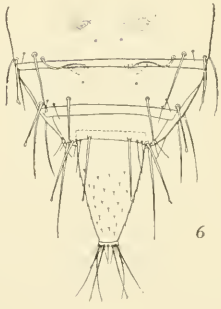
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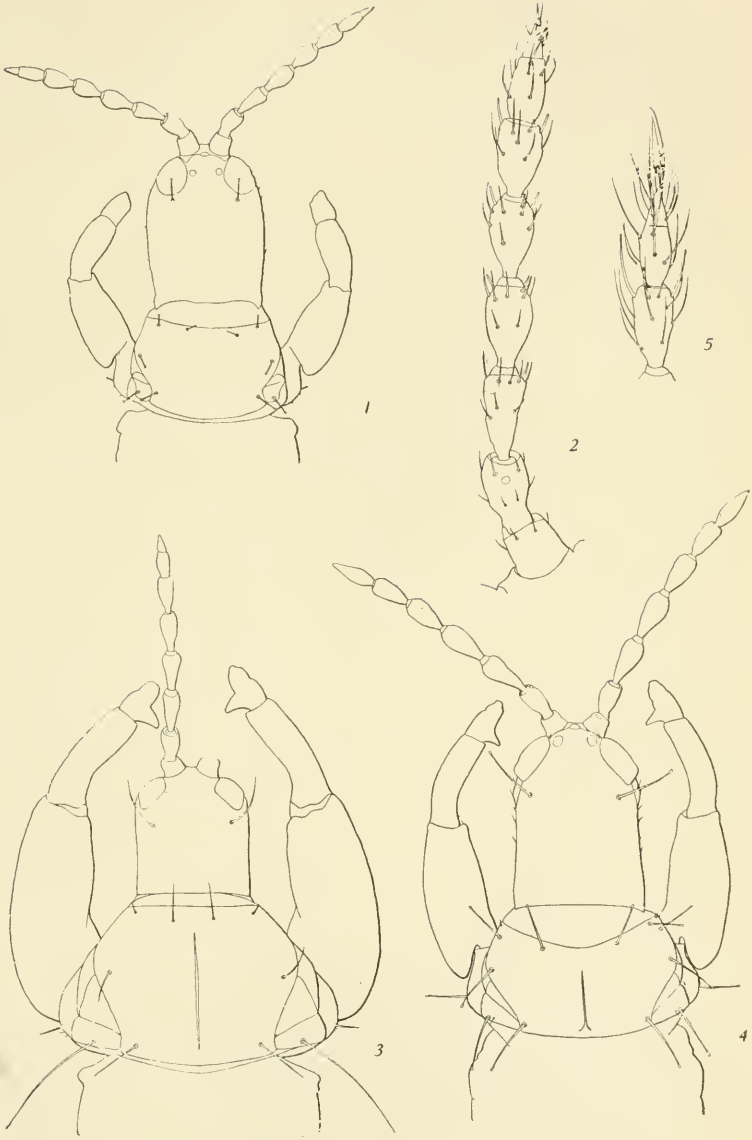

Thysanoptera.

STUDIES IN SYRPHIDÆ—IV. SPECIES OF ERISTALIS NEW TO AMERICA, WITH NOTES ON OTHERS.

BY RAYMOND C. OSBURN,

NEW YORK CITY.

It is well known that numerous species of insects first described from Europe have since been found to occur in North America. This is perhaps true to a larger extent in the Syrphidæ than in any other dipterous family, as not only are the syrphids very active on the wing, but they are also more independent in their food habits than are most insects. Many of them are predaceous in the larval stage, feeding on soft-bodied insect larvæ and aphids, while others pass the larval stage in decayed wood or in water containing decaying matter. The general distribution of these makes it possible for many of the syrphids to find suitable conditions for life over wide areas. Thus *Eristalis tenax* (L.) has attained to a world-wide distribution, as sewage and other filth in which it may breed occur everywhere. A few other species are also widely distributed in both hemispheres and many more are circumpolar.

Even species which are more limited in the matter of food may sometimes be transported, as is the case with *Merodon equestris* (Fab.), parasitic in bulbs of liliaceous plants. This European species has been repeatedly taken on both the Atlantic and Pacific coasts and is possibly established in some localities.

In the present paper the writer wishes to report the occurrence of two more well-known European species in America and to establish a third hitherto reported doubtfully.

Eristalis arbustorum (Linne).

The attention of the writer was first attracted to the presence of this species in America in the summer of 1910 when, on July 10 a number of specimens were taken at Ft. Lee, N. J. The flies were common about the flowers of the wild carrot, but only a few were taken as they were supposed to be only the common *E. meigenii* Wiedemann. On pinning them, however, it was noticed that the

females especially looked somewhat different from *meigenii,* and on comparing them with specimens of *E. arbustorum* from Europe in my collection they were found to belong to the latter species. I then looked over my series of *meigenii* very carefully, with the result that a number of *arbustorum* were discovered, some of them dating as far back as 1906.

A few days later the above locality was revisited, when I collected about fifty specimens, males and females about equally represented. After this, for a time, I took all the specimens of both *meigenii* and *arbustorum* that came in my way, with the result that the latter species soon became much better represented in my collection than the former.

Also, on looking through the collections of the American Museum of Natural History, the Museum of the Brooklyn Institute of Arts and Sciences, the Staten Island Museum and the Cornell University collection, as well as a number of private collections, I found numerous specimens of *arbustorum* masquerading as *meigenii.*

A short time ago Mr. Frederick Knab of the National Museum at Washington wrote to me in regard to the occurrence of *E. arbustorum* in America, as he had found a specimen so labelled in Coquillett's writing in the collections of that museum. This reminded me that it was time some mention of the occurrence of this species in America should be made in print.

From my own observations and from the personal study of material in my own and other collections I can now state that *E. arbustorum* is widely distributed over eastern North America, as far west as Ohio, south to Virginia and north to Labrador. My own collection consists of more than a hundred specimens covering points within this range and I have examined as many more in other collections.

On corresponding with other dipterologists, I find that all of them who have collections from the region mentioned confess to having specimens of *arbustorum* confused with *meigenii.* Prof. J. S. Hine, of the Ohio State University, states that he has specimens from northern Ohio. Mr. Chas. W. Johnson, Director of the Museum of the Boston Society of Natural History informs me that he has specimens from all the New England states except Vermont and that this species is much more common than *meigenii.* Mr. E. T. Cresson, Jr.,

states that there are two female specimens in the collection of the Philadelphia Academy of Sciences. From Mr. H. S. Harbeck of Philadelphia I learn that he has ten specimens of *arbustorum* and that a friend took a series of twenty last summer. Mr. V. A. E. Daecke, of Harrisburg, Pa., writes that ten out of twelve from that region are *arbustorum*. Mr. Frederick Knab, of the U. S. National Museum, states that the species is now common about Washington, though the earliest records are for 1908.

The question has been raised by some of my correspondents as to the specific distinctness of these two species. Without doubt they are closely related, as may be judged from the amount of confusion recently existing in collections. They are so similar in size, form and general coloration that, without a careful examination, one would unhesitatingly place them together—as we all did!

The difference in extent of the velvety bands of the third and fourth abdominal segments is sufficient to separate the species, though in the males some familiarity with this character may be necessary. The differences in the abdominal markings are as follows:

First and second segment. Similar, with sexual differences only.

Third segment of male. Similar, though the velvety black bands are somewhat wider in *arbustorum* than in *meigenii*.

Fourth segment of male. Dissimilar; a distinct transverse band of velvet on the base of the segment and another, usually narrower, in front of the yellow posterior marginal band in *arbustorum*, while in *meigenii* the velvet is limited to a minute basal median spot (often wanting) and an occasional trace of the velvet black in front of the yellow hind border.

Third and fourth segments of female. Dissimilar; in *meigenii* these are entirely shining except for the occasional presence of a minute median basal spot of velvet and a mere trace of the same in front of the yellow hind border, while in *arbustorum* there are distinct bands of the velvet on the basal part of both segments as well as similar bands in front of the yellow hind border.

An easier character is found in the color of the basal joint of the tarsus of the middle legs. In *arbustorum* this joint is yellow or orange except at its extreme tip, which is sharply brown, while in *meigenii* the whole joint is dark brown like the rest of the leg.

It may be thought that these characters are unsatisfactory for the

separation of the species, yet in the examination of nearly 200 specimens of *arbustorum* and 100 of *meigenii* I have first separated them on the basis of the abdominal markings and then on the leg character and have found my determinations to agree in every case.

At first it occurred to me that these differences might be seasonal, indicating different broods, but the facts that the two species occur together and that both are found throughout the season preclude any such possibility.

Now it is of interest to note that in all the collections personally examined or reported to me there are no specimens dating back farther than 1906. This brings up the question whether *E. arbustorum* is a recent addition to our fauna or whether it has been here all the time and has been overlooked by all former students of the Syrphidæ. Obviously the answer to this question is not easy, unless one has sufficient faith in the infallibility of the older workers in this group. However, it would seem that if *arbustorum* is not a recent acquisition it should be found among the older collections, even if not properly identified. As this species does not, to my knowledge, appear in any of the older collections I believe the assumption is warranted that it has been introduced into America rather recently, has found the environment congenial and has spread rapidly and widely in a comparatively short time.

E. arbustorum occurs in Europe, N. Africa, Asia Minor and Siberia. The records at hand for the American distribution are as follows:

New York.—Staten I. (Wm. T. Davis); Long I. (several collectors); Manhattan I. and the adjoining mainland (R. C. O.); South Lake and East Jewett, Catskill Mts. (Wm. T. Davis); Ithaca (Cornell Univ. Coll.); Carmell.

New Jersey.—Palisade, Ft. Lee, Lakehurst and Ramsey (R. C. O.); Fairlawn and Sewall (E. L. Dickerson).

Pennsylvania.—Philadelphia (H. S. Harbeck and V. A. E. Daecke); Swarthmore and Hazelton (E. T. Cresson, Jr.); Harrisburg (V. A. E. Daecke); White Mills.

Maryland.—Baltimore (W. L. Dolly, Jr.); Lakeland and College Park (F. Knab); Bethesda (J. C. Crawford); Cabin John, Cabin John Bridge and Plummers Island (R. C. Shannon).

District of Columbia.—Washington (F. Knab); Rock Creek (R. C. Shannon).

Virginia.—Hampton (J. Barlow); Norfolk (F. A. Johnson; Pimmit Run, Four Mile Run, Glen Carlyn and Falls Church (F. Knab).
Ohio.—Newark (R. C. O.); Ira (J. S. Hine); Cincinnati (C. Dury).
Connecticut.—Danbury (C. W. Johnson); Brookfield (E. L. Dickerson).
Rhode Island.—Buttonwoods (C. W. Johnson).
Massachusetts.—Forest Hills (Wm. T. Davis); Westport and Southbridge (C. W. Johnson); Framingham (C. A. Frost).
New Hampshire.—Fabyan (J. L. Zabriskie); Bretton Woods, Mt. Washington (C. W. Johnson).
Maine.—Ft. Kent and Eastport (C. W. Johnson); Orono (H. M. Parshley).
Ottawa.—Canada.
New Brunswick.—St. Johns (Geo. G. Engelhardt).
Labrador.—Battle Harbor (Geo. P. Engelhardt).

The first capture of *E. arbustorum* in America, as far as my information goes, dates from June 15, 1906, when a single female was taken by me at Ft. Lee, N. J. In 1908 a number of records appear, specimens having been taken by Barlow, Knab, Cresson and myself, and by 1909 the species apparently became common over a large part of its present range. The seasonal range, according to the records in my possession, is from April to October inclusive.

Eristalis rupium Fabricius.

This species, which is also well known and widely distributed in Europe, is here recorded for North America for the first time. Six specimens, one male and five females, were recently sent me for identification by Mr. E. M. Anderson, of the Provincial Museum, Victoria, British Columbia. These were taken by Mr. Anderson at Atlin, B. C., near the Alaskan boundary and about 100 miles inland.

The well-marked brown spot on the middle of the wing will serve to distinguish *rupium* from other species of this genus in boreal America, except *E. bastardii* and *E. occidentalis* which are densely pilose species, and *E. saxorum* from which it differs by its smaller size, by the more reddish appearance of the male and the entirely shining third abdominal segment of the female.

Eristalis nemorum (Linne).

In 1883 Van der Wulp (Tijdschr. v. Ent., XXV, p. 128) doubtfully recorded this species from Quebec, Canada. Ever since it has existed in catalogs of American diptera accompanied by a question mark. It now becomes my pleasant duty to remove this distasteful sign and to list the species as a widely distributed North American one, known positively from seven different localities, occurring both in the United States and Canada and ranging practically from coast to coast.

The first specimen to come to my attention was a male taken Aug. 31, 1904, at Vernon, B. C. (near Vancouver), by Mr. R. V. Harvey. While on a collecting trip into British Columbia in the summer of 1912 the writer took a male and a female specimen at Kaslo on July 11, and one female at Revelstoke on July 14. Mr. J. W. Cockle, of Kaslo, presented me with a male taken by him on May 7, 1910.

In recent correspondence Mr. Chas. W. Johnson informs me that there are in the Museum of the Boston Society of Natural History four specimens taken as follows: Newport, Vt., July 1, 1891 (A. P. Morse), Montreal, Canada, Sept. 1, 1905 (G. Beaulieu), Machias, Me., July 26, 1909, and St. Albans, Vt., June 21, 1912 (C. W. Johnson).

In North America there are now known five species of the genus Eristalis which occur also in Europe. These are:

E. æneа (Scopoli), widely distributed over both continents.

E. arbustorum Fabricius, widely distributed over Europe, northern Asia and into northern Africa, and here recorded for the first time as a common species in northeastern North America.

E. nemorum (Linne), common in Europe and well distributed, but apparently not common, in Canada and the northern New England states.

E. æstraceus (Linne), described as *E. æstriformis* by Walker from a single specimen taken in the Hudson's Bay Territory. It has recently been shown in Austen (Ent. Monthly Mag., 2 ser., vol. XXII, p. 63, Mch., 1911) that Walker's *æstriformis* is identical with *æstraceus*.

Apparently only the single specimen from Hudson's Bay, which is still in the British Museum, has ever been taken in America.

E. rupium Fabricius, a well-known European species, here recorded from northern British Columbia for the first time as a North American species.

E. tenax (Linne), now distributed over nearly the whole world, though formerly limited to the eastern hemisphere. The records for this species in North America go back only to 1870.

Eristalis latifrons Loew.

This species has been considered as limited in its distribution to the western part in North America, where it has been listed from nearly all the western states east to Kansas, north into British Columbia and south into Mexico. During the summer of 1901 I took a number of specimens at Fargo, N. D., and supposed that this was about the eastern limit for the species. Later, on examining the collections in the American Museum of Natural History, I found specimens taken by Prof. W. M. Wheeler in Wisconsin. Within recent years, however, several specimens have been taken in the vicinity of New York City. The first of these, as far as my observations go, was taken near Brooklyn, N. Y., on July 15, 1908, by Mr. Geo. P. Engelhardt. Another was taken at Snake Hill, N. J., on July 16, 1911, by Mr. John A. Grossbeck, and I have seen others. These eastern specimens are indistinguishable from western ones.

THE DEER BOT-FLIES (GENUS CEPHENOMYIA LATR.)

By J. M. ALDRICH,

LA FAYETTE, IND.

The discovery of adults of a North American species of *Cephenomyia* seems to justify some discussion of the history, taxonomy and biology of the genus.

There are four European species, all quite fully treated by Brauer in his classic "Monographie der Oestriden" of 1863. All live in the larval stages in the nasal passages, on the soft palate, at the base of the tongue, in the Eustachian tubes and pharynx of various members

of the deer family. *Cephenomyia rufibarbis* Mg. (name changed to *auribarbis* Mg. in the Paläarctic Catalogue on account of "page priority") is found in the stag; *ulrichii* Br., in the elk; *trompe* L., in the reindeer; and *stimulator* Clark in the roe (the Pal. Cat. also mentions *Cervus pygargus*). They are at times found in large numbers in the host; Brauer (p. 192) states that stags and roes dying in spring are often so badly infected that the bots must be a principal cause of their death.

From Patagonia Guérin described *Cephenomyia grandis* (Iconog. règne anim., 547, 1843 or earlier) from an adult, nothing being reported about its life history.

The preceding data include all the described species, outside North America, as far as the literature is known to the writer.

In North America only one doubtful adult has been mentioned up to the present, the one which was described from Georgia as *Œstrus phobifer* by Clark, Essay on Bots, 69, 1915. The description of this species was much too general and too brief to indicate the generic relations; Brauer, however, happened to get hold of an old portfolio of Meigen's drawings just as his Monograph was nearly printed, among which was a drawing labeled *Œstrus phobifer*. In the belief that Meigen had actually seen and drawn Clark's specimen, Brauer reproduces this sketch (pl. v, f. 11), with notes on page 291. The venation indicates a *Cephenomyia*, but the rest of the sketch hardly shows any characters. The century which has passed has brought no further light on the matter, and we can only refer the species to *Cephenomyia* with an interrogation mark as heretofore. In any case, it is not the same as the species herein described.

There are however several references to larvæ from North America in literature. On page 202 of his Monograph, Brauer mentions larvæ of *Cephenomyia ulrichii* Br. from throat of an elk in North America, sent him by Osten Sacken; as no North American adults are known, there must be considerable doubt of the specific identity of the species.

On page 211, Brauer describes two larvæ sent him from North America by Osten Sacken, taken from *Cervus macrotis* Say in the northwestern part of the United States (in copying the reference in my catalogue, I inadvertently introduced the word *by* before Say): in the index this species is called *Ceph. macrotis*, but no specific

name occurs in the text. Osten Sacken, Cat., 1878, 145, says the larvæ were from the throat of the deer.

In Zweifl. d. Kais., Mus. zu Wien, iii, 82, 1883, Brauer mentions a species occurring in the throat of *Cervus mexicanus* in Durango, Mexico; in the same series, vii, 547, 1893, Brauer and von Bergenstamm apply the name *Ceph. mexicana* to this undescribed larva.

Riley and Howard, Insect Life, i, 386, 1889, report larvæ sent in from California, taken from a "pocket under the jaw" of deer, and said to be common; referred doubtfully to *Cephenomyia*, but from the habit pretty certain to belong here.

The same, ii, 116, 1889, note occurrence of larvæ of this genus in nasal passages of man near San Bernardino, Cal.; more than 40 larvæ were removed.

The same, iii, 162, 1890, note on larvæ in the throats of hogs in West Virginia; doubtfully referred to this genus.

Mr. W. L. McAtee, of the Bureau of Biological Survey, Washington, writes under date of May 13, 1915, that his Bureau received this spring from Aragon, N. M., the larynx of a mule deer in which were a large number of the larvæ of a fly of this genus.

The behavior of adults is entertainingly described by Brauer, and as I have never seen the passage in English, I translate with some abridgement from his Monograph, pp. 184–187:

"The behavior of these flies is quite varied. Some species are very dull and sit in the cage for weeks without seeking liberty; others however, as soon as their wings are fully developed, begin to beat against the walls so vigorously that care must be taken not to let them live longer than necessary. One of the dullest kinds that I have observed is *Cephenomyia rufibarbis*, while *Cephenomyia stimulator* and *Pharyngomyia picta* are very active. The first, as one would expect, does not fly far from the haunts of its host, while the other two ascend high in the air and greet the mountain-climber as he gains the summit, even in the Alps, where they fly back and forth, pendulum-like, before him, and alight upon him. At lower temperatures they are more quiet, and as this condition usually prevails at summits, they are commonly found sitting on warm stones. On some days *Cephenomyia stimulator*, which more than the others ascends the highest Alpine summits, occurs in abundance at these heights, where many individuals dart wildly at each other or buzz close around

the warm rocks. Professor Zeller took this species on the high Mensa and on Spitzberg in the Riesengebirge; I have taken many specimens of it on our Schneeberg and the nearer but smaller Bisamberg, but among these were only three females. . . . On the occurrence of a storm the flies like other insects desert the peaks and hide in crevices or other protected places. But they are not afraid of a strong wind, and with astonishing endurance endeavor to maintain themselves at the top. The preference of these flies for rocky peaks, old towers and isolated triangulation pyramids is very useful to the entomologist, who can obtain them there, although elsewhere they would be extremely rare. We are indebted for the discovery of this habit to the entomologist Saxesen in the Harz. . . .

"The deposition of the larvæ I was once enabled to observe very closely in *Cephenomyia rufibarbis*. It was on a hot day in May, after a morning shower, and the air was still and sultry. In the warm sunshine these Œstrids were flying and encircled in vertical arcs the heads of the deer [stag, *Hirsch*]. While the fly circled noiselessly, the deer followed it with its eye, stamped angrily, and often closed the nostrils and breathed heavily. Suddenly the fly darted at the open nostril, not alighting, but instantly turning back; this was repeated several times. The deer began to sneeze, struck out with its fore feet, attempted to scratch its nose with its hind foot and to rub it on its fore leg; at length it started to run, stopping in a short distance to sneeze, strike, scratch and rub as before. The fly was several times driven to the ground by the sneezing of the deer, but recovered itself with a loud buzz and flew slowly away.

"Even a single fly of this kind produces a marked effect upon a herd of deer; immediately the deer all prick up their ears, look up in the air and close their nostrils. While the Cephenomyia female flies among the herd, depositing her maggots one by one, a peculiar rhythmic movement passes over the animals, snorting and stamping followed by quiet, and this repeated three or four times, until the fly departs or the herd scatter into deep woods, when the same play is repeated with a nearby herd.

"The strong responsive movements of the host are explained by the fact that the fly deposits, each time she approaches the nasal opening, a drop of fluid with very active living larvæ; these attach themselves at once with their strong hooklets and thus induce the

violent sneezing. I satisfied myself of this by capturing a female fly, when by pressing the abdomen I could secure a drop of fluid with from 9 to 12 larvæ. The ejection occurred with force; whether this would be the case in life I will not say, but it is possible, as the female only approaches the host and does not alight. . . .

"*Cephenomyia trompe* deposits young like *rufibarbis;* I found young larvæ sticking to the hairs of the abdomen of a female in my collection."

Generic Characters of Cephenomyia.—Robust species with rather dense and long pile. Wing with apical crossvein, the cell open; posterior crossvein joining the fourth vein some distance before the beginning of the apical crossvein; fourth vein distinctly continued beyond the latter (see figure). Eyes rather widely separated in the male, more so in female; antennæ small, third joint very short, arista bare, thick at base, dorsally attached to third joint; ptilinal suture widely diverging to near the eyes below, antennal cavity small but deep, continued below as a narrow groove to the oral opening; mouthparts entirely concealed by the long pile, apparently not developed, but by removal of the hair a small proboscis and a pair of palpi are found.

The nearest ally, at least in North America, is *Hypoderma,* in which the posterior crossvein is almost continuous with the apical, there is no continuation of the fourth vein beyond the latter, there are two separate antennal cavities, etc. *Cuterebra* is much less pilose, the head especially being almost bare, the arista is plumose, fourth vein with a rounded bend, etc.

Cephenomyia abdominalis new species. (Plate XI:)

Male.—A robust black species, thorax with yellow pile except a tuft of black over each wing; that on head yellow except on parafrontals, running somewhat down on parafacials; pile of abdomen black except on basal half or more of first segment (and in one of three a few pale hairs on fourth among the black); basal half of femora with long yellow pile behind.

The only known species with solid black pile on abdomen, beyond the first segment; differs from all the European species in not having conspicuous red, yellow or white pile on the abdomen, and in having no black pile on the thoracic dorsum except a tuft over the base of each wing.

Head black; front not very prominent, at vertex about one-fourth the entire width of head; middle stripe with yellow pile; the eyes diverge from each other rapidly below; in profile the bucca is about one-fourth as high as

the eye, but so concealed by dense yellow pile that it cannot be measured satisfactorily; face very wide, with long yellow pile (mixed a little with black above on one specimen); structure of antenna, face and mouth-parts as given above in generic characters; the yellow pile of face continues below to the occiput, but there is a line of black hairs immediately behind the eye.

Thorax shining black, showing through the pile over the middle; scutellum with long and dense yellow pile, which forms a long fringe behind.

Abdomen thick, rounded, shining black or with a tinge of violet, with dense, erect black pile not as long as the thoracic; four distinct ring-like segments, the fifth and sixth together somewhat disklike, and bearing anteriorly the clasping organs, which are normally concealed well forward in the venter.

Legs black, of moderate stoutness, black-haired except the basal part of the femora; claws black, pulvilli dark brown.

Wings strongly infuscated along the veins, and especially in the region from the anterior crossvein to the costa. Length, 14 mm.; of wing, 12 mm.

Three males, collected by Mr. Wm. T. Davis on White-Face Mountain, in the Adirondacks, New York; July 6 and 10, 1914. The type and one paratype are returned to Mr. Davis, the other paratype remains in the collection of the describer.

Mr. Davis lived at the base of the mountain for some days, making almost daily ascents to the summit; he says, "Along the trail there were several open places where the sun shone warmly, and where we found many insects, and I think the botflies." From the general resemblance to some woolly Syrphids (*Criorhina verbosa, Eristalis flavipes*), the botflies were not recognized at first as important, hence the exact locality was not remembered.

The figures in the plate have been retouched to bring out the yellow pile, which showed but little in the print.

MISCELLANEOUS NOTES.

Silpha surinamensis and Creophilus villosus as Predaceous Insects.—While at Wilmington in 1914, Mr. Ernest Shoemaker and I heard that a neighbor had killed a porcupine that had been found investigating an outhouse. We secured the animal and carried it to a nearby wood to serve as a bait for insects.

On the morning of July 11 we found many *Silpha surinamensis, Silpha americana* and *Creophilus villosus* about the remains. It was raining at the time. On the way home I visited the spot with

Photo by P. W. Mason.

Cephenomyia.

the object of procuring the skull of the porcupine and was surprised to find that within two hours many *Silpha lapponica* and some *Necrophorus tomentosus* and *Necrophorus orbicollis* had arrived. I was still more surprised to find many of the *Silpha surinamensis* engaged in extracting fly larvæ from the carcass and devouring them as rapidly as possible. *Creophilus villosus* was busy in the same way, but I did not observe that *Silpha americana* ate any of the larvæ.

The porcupine was visited again the next day, when *Silpha surinamensis* was found to be still busy catching fly larvæ, and I saw scores of them pulled from their hiding and devoured while still wriggling. *Creophilus villosus* was equally active and individuals of both species could be seen running about, each with a larva in its mandibles. They would often seek some quiet place to devour the tender grub. On one low plant I saw three *surinamensis* each one devouring a larva, but they usually did not climb on anything, but sought some retreat on the ground, while others were content to devour their captives while stationed on the remains of the porcupine and among the moving throng of their companions. It was difficult to say which was the more active in larvæ catching, *Silpha surinamensis* or *Creophilus villosus*. At one place I saw some *Silpha surinamensis* feeding on one of the legs of the porcupine, but the majority were undoubtedly in quest of fly larvæ. Thousands of the larvæ that were engaged in devouring the putrid porcupine were thus destroyed and their good work cut short.

It is known that the habits of the members of both of the families Silphidæ and Staphylinidæ are quite varied, and this note merely emphasizes the fact more strongly that these beetles are not as generally beneficial as some of the text books state.—Wm. T. Davis.

Dicerca obscura and Dicerca lurida.—During the past summer I took in Virginia on persimmon some fifty odd specimens of *Dicerca obscura* and at same time took on hickory numerous specimens of *D. lurida*. In life, the appearance of these two species is so different that they can be distinguished at a glance. In *obscura*, the ground color is blacker, the elevated portions more shiny, the pruinosity in the depressed portions whiter; in *lurida*, the ground color is coppery, the pruinosity grayer. When, however, a specimen has been pinned for a couple of months, these differences become less and

more difficult of appreciation and of definition. Although, as Casey has stated, the species are abundantly distinct, *lurida* is given as a variety of *obscura*. In looking over recently two collections in which the two species were hopelessly confused, I have struck what I believe to be the clue to the matter. The usual analytical tables separate the species by the character "thorax widened from base, *obscura*," etc. While this character is true of *obscura*, in a large series of *lurida* many will be found to which it also applies and it is just these luridas with intergrading thorax which are wrongfully identified as *obscura* and which cause true *lurida* to be regarded as a variety.

I have found, however, other characters by which the species may be separated and venture to give these in the following table in order of their importance.

A (*a*) Hind coxal plate notched at insertion of femur and with distinct tooth on outer side of notch.
(*b*) Lateral margin of thorax viewed from beneath and sidewide presenting a polished carina for at least one-half of length from base.
(*c*) Food plant persimmon ..... *obscura*.
AA (*a*) Hind coxal plate not or very feebly notched and with no tooth.
(*b*) Lateral margin or thorax viewed from beneath and sidewise presenting merely a trace of polished carina, not over one-fifth of length from base.
(*c*) Food plant hickory ..... *lurida*.

In separating the closely allied species of *Dicerca*, I believe more attention should be paid to the food plants. In Virginia, the species of the *divaricata* group which feeds on sugar maple is markedly different from the species which feeds on peach.

I have found difficulty in separating by analytical tables *Chalcophora liberta* and its allies from *Ch. fortis*. In the small series in my collection, I note that the prosternal spine in *liberta* and its allies has two longitudinal parallel sulci, while in *fortis* there is but one sulcus. If this holds for a larger series, it would serve to separate the two without having to depend upon the ratio of length to breadth of elytra, a character not easy to determine with certainty.—Wirt Robinson.

A Small Collection of Odonata from Atlin, British Columbia.—Mr. E. M. Anderson, of the Provincial Museum, Victoria, B. C., has

sent me recently a small collection of dragonflies taken by himself at Atlin, B. C., near the northern boundary of the Province and about a hundred miles inland. I record them here merely because of the locality and because two of the species are new to British Columbia.

Enallagma calverti Morse. Taken at hot springs at Atlin, both sexes. Widely distributed over boreal America and previously recorded from southern B. C. by Currie ('05) and Osburn ('05) and from Alaska by Currie ('01).

Enallagma cyathigerum (Charpentier). Taken at hot springs of Atlin, both sexes. Holarctic. Previously recorded from southern B. C. by Currie ('05) and by Osburn ('05) and from Alaska by Currie ('01) as *E. annexum.*

Aeshna eremita Scudder. Taken at Atlin, one female. Hudsonian and Canadian. Previously recorded from southern B. C. and from Alaska by Walker ('12).

Aeshna sitchensis Hagen. Taken at Atlin, new to B. C., one female. Hudsonian and Canadian. Recorded from Alaska by Hagen ('61).

Somatochlora hudsonica (Hagen). Taken at Atlin, new to B. C., and not hitherto known west of the Hudson's Bay region. One male.

Leucorhinia hudsonica (Selys). Taken at Atlin, both sexes. Boreal. Previously recorded from southern B. C. by Currie ('05) and Osburn ('05) and from Alaska Currie ('01).

Leucorhinia proxima Calvert. Taken at Atlin, males only. Boreal. Previously recorded from southern B. C. by Currie ('05).

It will be seen from the general distribution, which I have given for the purpose of comparison, that all these species, except perhaps *S. hudsonica,* should be expected from Atlin. The westward range of *S. hudsonica* is considerably extended by this record.—Raymond C. Osburn.

Some of the Insects of Chesapeake Beach, Maryland.—A little to the southward of the bathing resort of Chesapeake Beach, Maryland, there are some high bluffs of clay which the waves are ever undermining, with the result that large masses fall and lie in the water at

the base of the perpendicular cliffs. On June 24, 1914, I found several specimens of the sea going bug *Halobates micans* Esch. (*wuellerstorffi* Frauenfeld) swimming about among these masses of clay, but was more surprised to find the beetles *Dineutes hornii* Roberts and *Gyrinus* sp. The water is salt enough to be the home of many sea shells and crabs, so the beetles were not expected.

At the base of the cliffs, where there is a narrow beach of several feet, *Bembidium lævigatum* Say was found in some numbers, and in one place where there is a short sandy beach between two of the bluffs, Mr. Ernest Shoemaker and I collected the tiger beetles *Cicindela puritana, C. marginata, C. hirticollis, C. repanda,* and on the extreme upbeach *C. punctulata.* The specimens of *hirticollis* are remarkable on account of their broad white markings, as broad as in many specimens of *generosa.* On the moist ground of the more gentle sloping sides of some of the banks were grouse-locusts, *Paratettix cucullatus* Burm. and *Tettigidea lateralis* Say; also a number of toad-bugs, *Gelastocoris oculatus* Fabr. A trip to Chesapeake Beach, made in June, 1911, was commented upon in this Journal for March, 1912.—Wm. T. Davis.

PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING OF FEBRUARY 16, 1915.

A regular meeting of the New York Entomological Society was held February 16, 1915, at 8:15 P.M., in the American Museum of Natural History, President Dr. Raymond C. Osburn in the chair, with 16 members, and two visitors present.

The curator reported the addition of a paratype of *Papaipema humuli* to the local collection, by gift of Mr. Henry Bird.

Mr. Davis recommended the publication by the society of a Check List of Hemiptera, written by E. P. Van Duzee, and presented for publication by him through Mrs. Annie Trumbull Slosson. Mr. Davis offered to advance the cost of the printing, the amount to be repaid without interest as funds accrued from the sales until the entire amount advanced had been repaid; the proceeds of sales thereafter to belong to the society.

Mr. Barber, Mr. Schaeffer, Dr. Lutz and Dr. Osburn spoke in favor of the project and on motion by Dr. Lutz, the offer of Mr. Davis was accepted and the work accepted for publication.

Mr. Dow, under the title of "The Land of the Rose Apple Tree," spoke of the entomological references in the sacred writings of India, comparing them with those of other countries, and summarized all he had been able to trace up to the time of Aristotle as one hundred and twelve from the Greek, ten from the Hebrew, four from the Chinese, eight from the Zend, forty from the Sanscrit, but with the probability of the latter being greatly increased as further search became possible, judging by a passage he had found in which familiar names for several hundred kinds of trees were given. In the Sanscrit as elsewhere the early references are to white ants, wood-boring larvæ, flies, crickets, mosquitoes, wasps and other insects liable, from their usefulness to man or their painful attacks upon him, to attract attention. In many instances, the interpretation of the vague references required some knowledge of entomology, as well as imagination. "The Insect Catalogue of Earlier Greece" closed Mr. Dow's remarks.

Mr. Wintersteiner's paper, "the Genus *Helophorus*." was read, in his absence, by the secretary, and will later be published in full.

Mr. Davis read a paper on "Nest of *Formica schaufussi*," which will be printed in Miscellaneous Notes.

MEETING OF MARCH 2, 1915.

A regular meeting of the New York Entomological Society was held March 2, 1915, at 8:15 P.M., at Heim's Restaurant, President Dr. Raymond C. Osburn in the chair, with twenty members, and four visitors present.

The treasurer exhibited the plates and photographs of Cicada for the forthcoming JOURNAL, which he stated would not be at the cost of the society, but his own.

Mr. Dow, for the Field Committee, reported tentative plans for an outing on Pussy Willow Sunday at Beaver Meadow, five miles north of Coytesville, N. J., where, between the hemlock woods the cascades and the meadows on the site of the old beaver pond, he believed good and varied collecting would be found.

Dr. Lutz recalled that the place selected was the scene of his first outing with the society, six years ago, and endorsed Mr. Dow's selection.

Mr. Mutchler exhibited a number of West Indian beetles from the museum collections, and spoke of the progress being rapidly made in accumulating a comprehensive named collection. He commented particularly on *Ulosoma tricornis* of the West Indian List, apparently cited in error for *U. biimpressa*, since all the specimens examined agreed better with the description of the latter in respect of cephalic horns and pronotal punctuation.

Mr. Leng commented on the resemblance between the Floridian *Apenes opaca* and the West Indian and Bahaman specimens of *Apenes* (or *Cymindis*) *parallela*.

Mr. Schaeffer exhibited specimens of a number of species of Coleoptera new to the United States, in reference to which he has a paper now in process of publication, and explained the sources from which they had been obtained

and the characters by which they could be recognized. It was interesting to note that the first genus mentioned, *Trechus*, was also the subject of Mr. Schaeffer's first entomological paper.

Mr. Leng read a paper on "Recent Publications in Scolytidæ" in which the important papers of the past eight years, especially those by Hagedorn, Nusslin, Reitter, Swaine and Hopkins were reviewed, and a general commentary on the habits of the family included.

In the discussion that followed, Messrs. Dickerson and deVyver spoke particularly of the three species of horticultural interest, *Scolytus rugulosus* and *quadrispinosus* and *Phlœotribus liminaris*, and experiment station literature thereon, particularly the Ohio Bulletin by Gossard.

Mr. Davis spoke of the Cicindela highway on the road between Ridgeway and Whitesville, N. J., where in one day, August 22, 1912, he had taken eight species, *generosa, purpurea, tranquebarica, obscura, rugifrons, consentanea, rufiventris, punctulata* and two more, *repanda* and *unipunctata*, later, nearby, as a preliminary to the exhibition of five species found on Chesapeake Beach, Md., with photographs of the locality and his companion; the latter in a costume adapted to the capture of the seagoing bugs that frequented the pools formed between the pieces of clay that fell from the cliffs above.

A complete account of the insects thus found swimming in salt water, as well as the Cicindelidæ of this beach will be published elsewhere.

Mr. J. R. de la Torre Bueno, present as a visitor, remarked that the specimens shown were the first winged *Holobates* he had seen.

Mr. Sherman exhibited *Miscodera arctica* from Lake Superior and *M. insignis* and *Zacotus matthewsi* received from Dr. Van Dyke.

Mr. Nicolay called attention to *Mordellistena ambusta* as an addition to the local list, based on specimen from Bronxville, N. Y., caught and identified by Mr. Woodruff.

Mr. Dow spoke of correspondence with various collectors, R. E. Ludwig of St. Petersburg, Fla., Fordyce Grinnell of Los Angeles, Calif., famous for his success in interesting boys in natural history, Warren Knaus of McPherson, Kan., Ralph Hopping, H. C. Fall, Charles Dury and others, particularly in connection with Mr. Dury's discovery of the number of small Coleoptera that could be caught under a pile of cut grass, kept moist, and with attractive bait, watermelon rind, etc., added. He said that he hoped to secure valuable distribution data, as well as specimens, by having this peculiar environment repeated at widely separated places.

MEETING OF MARCH 16, 1915.

A regular meeting of the New York Entomological Society was held March 16, 1915, at 8:15 P.M., in the American Museum of Natural History, President Dr. Raymond C. Osburn in the chair, with 12 members, and three visitors, Dr. J. M. Aldrich, of Illinois, and Miss Cain and Miss Clarke, of Columbia University, present.

Dr. Aldrich spoke on "Western Salt Lakes and their Insect Inhabitants."

After explaining the difference between the salt lakes, containing principally sodium chloride, and the alkaline lakes, containing carbonates as well, and the great difference between the percentage of solid matter, ranging from one per cent. or less and accompanied by presence of fish, up to twenty-six per cent., Dr. Aldrich proceeded to show by lantern slides the scenery of the desert regions in which these salt lakes in Utah, Nevada and California are situated, and the peculiar flies, whose larvæ live in their waters. The slides exhibited especially the immense numbers of pupa cases drifted on the shores of the lakes, and the differences between the pupæ and the larvæ of the different species. The conditions under which the pupæ served the Piute Indians for food in former times and the methods of preparation were explained, and vials containing the "Cootsaapie," to use the Indian name, were exhibited. The dried larvæ of a large moth, also used for food, were included in the exhibit.

In the discussion that followed, Dr. Aldrich referred to the other insects of the salt lakes, particularly Cicindelidæ, and discussed with Dr. Osburn the relation between the oceanic and salt lake conditions for fish.

Mr. Shoemaker and Mr. Davis spoke of "Adirondack Insects," describing their visit to Whiteface Mountains, N. Y., on July 6, when they found insects, during the midday hours, in extraordinary numbers on the bare rocks at the summit. During the nine days they stayed at Wilmington, six miles from the summit, Mr. Shoemaker climbed the trail six times and Mr. Davis five times, and on one occasion they remained over night. The butterfly *Colias interior* Scudder was present in some numbers at the higher altitudes, and on warm days it was found at the top of the mountain. Several females were collected, but only one of them of the white variety. A number of rare species were included in the catch among the Coleoptera, as well as a large number of species and individuals, for example, 36 species of Cerambycidæ, 16 species of Coccinellidæ, etc. Among the Cerambycidæ were two species of *Anthophilax*, and among the Coccinellidæ an extraordinary series of *Harmonia 14-guttata*, exhibiting striking variations in maculation. In addition to collecting on the summit and along the trail, great attention was paid to the bait bottles, resulting in the capture of one *Nomaretus*. Mr. Davis commented particularly on the Silphidæ found on a dead porcupine, his remarks being printed in Miscellaneous Notes, and on the distribution of the seven species of Cicindelidæ taken, of which *repanda* occurred on the road and on the river banks, *12-guttata* on the river banks, *tranquebarica* from the valley to the summit of the mountain; *purpurea*, a single specimen, and *generosa* were found along the lower parts of the trail, the latter in but one place, while *6-guttata* extended on good days nearly to the summit, and *longilabris*, the most northern in geographic distribution, was not seen until part of the distance was climbed and then continued to the summit. The variation from our local types was also noticeable, one *6-guttata* having a middle band, all the *tranquebarica* being more or less coppery, and the solitary *purpurea* quite greenish in coloration.

Mr. Davis closed his remarks with an exhibition of photographs of the mountain and a humerous reference to a Bovalapus.

Mr. Dickerson presented a list of Geometridæ captured at Fourth Lake in the Adirondacks a few years ago, and identified for him by the late John A. Grossbeck, which list is attached, and commented on the activity of one of the species *A. vestaliata*.

MEETING OF APRIL 6, 1915.

A regular meeting of the New York Entomological Society was held April 6, 1915, at 8:15 P.M., in the American Museum of Natural History, Vice-President Harry G. Barber in the chair, with fourteen members and two vistors, André Avinoff, Fellow of the Entomological Society of London and member of the Russian Entomological Society, and Dr. Wm. A. Riley, of Cornell University, present.

The curator reported a donation of seven specimens of Noctuidæ from Mr. Shoemaker.

Mr. Dow, for the Field Committee, gave the details of an outing planned for April 11 to Central Park, L. I., and of one planned for May 31 to Beaver Swamp.

Dr. Lutz having withdrawn in favor of Mr. Avinoff, that gentleman spoke on the distribution of butterflies in Central Asia, particularly as exhibited during his own travels in Cashmere, Thibet and Turkestan. The speaker referred to the difficulty of tracing the southern frontier of the Palæarctic region in Central Asia, especially in its eastern portion, where it meets the Chinese-Indo-Malayan region in an irregular line, at varying elevations in the mountains.

Numerous illustrations, drawn from his experiences in collecting butterflies, were given of the height at which the palæarctic species were found in Cashmere, where everything above 6,000 ft. is palæarctic, in Nepaul at 9,000 ft., and in the Himalayas at 14,000 ft. Mr. Avinoff said he had found butterflies numerous at 18,600 ft. in the Himalayas, in August, when at that elevation there was no snow; and specimens of Parnassius were exhibited. Continuing he spoke of the Thibetan fauna as exhibited in the large collections made for Charles Oberthür by a Catholic missionary, all evidently taken at comparatively low levels, being Indo-Malayan in character; the level at which the palæarctic species would be found in Thibet is not definitely known, but estimated at 12,000 feet.

A comparison of the European fauna, where the mountains of the Pyrenees, Alps and Carpathians make a more definite boundary for the palæarctic (though elevated portions of northern Africa must be included), with the Asiatic was made, and the great similarity between Russia in Europe and in Asia was pointed out, the Ural Mountains forming no barrier of consequence; a line drawn north from Lake Baikal being a vague but more correct boundary between eastern and western forms. The Ethiopian region, the Mediterranean region, reaching eastward to the Crimea and plains of Turkestan and even to Quetta in Hindostan, and the Boreal region bordering the Arctic Ocean and exhibiting American relationships in northeastern Asia were also mentioned, as well as the wonderful variety of butterflies in the mountains of Turkestan,

where so many strains meet that many local forms, confined to small areas, result. Mr. Avinoff closed by describing the tortuous line by which the Thibetan faunal province is surrounded by palæarctic and other regions, and the variety of forms collectable in a single day on its mountainous border, by working at different elevations.

His remarks were discussed by Dr. Lutz, who pointed out the different opinion expressed by Schimper in regard to a division of the Siberian forest region, and by Mr. Angell in regard to *Coptolabrus* and other Carabid genera.

Dr. Riley being called on by the chairman, spoke briefly of the medical phases of entomology.

Dr. Lutz delivered his paper on distribution of West Indian spiders, abridged on account of the late hour, calling attention to the museum collection identified by Nathan Banks and the great additions to the Petrunkevitch catalogue resulting from museum expeditions. Notwithstanding the contrary opinion derived from study of other groups, he said he could find in the spiders no definitely distinct West Indian fauna, nothing but an admixture of continental forms, resulting from movements of species between the islands themselves and between them and the mainland. Peculiar forms, as far as they exist, are all of ancient types, and are evidently relics of past times, which are being replaced by more recent forms, principally from the north, though the extreme southerly islands naturally show more South American affinities, from their geographical proximity.

In the discussion that followed with Messrs. Avinoff and Schaeffer, Dr. Lutz showed how unnecessary theoretical land bridges were, and even ridiculous, for, if all the known cases of relic distribution in distant regions, like Madagascar and South America, were sought to be thus explained, the ocean would be filled with bridges; and how ample the millions of years in Tertiary time for the movements he advanced as explaining the distribution from the mainland.

Mr. Davis exhibited the specimens on which he based his latest supplement to the list of Macrolepidoptera of Staten Island, which he stated had now reached 673 species, of which 85 were butterflies, calling attention particularly to an intermediate specimen of *Papilio* which was neither *turnus* nor *glaucus*, though somewhat nearer to the latter; and to the spring form of *Attacus luna*.

Referring again to the insects caught in the Adirondacks while with Mr. Shoemaker, he also read a letter from Dr. J. M. Aldrich, in which the botflies he caught were stated to be probably the first adults of *Cephenomyia* ever caught in the western hemisphere.

This genus is known in the Old World to live as larvæ under the skin of deer. Mr. Davis said his specimens were caught in open spots among evergreens, loafing lazily on vegetation.

THE NEW YORK ENTOMOLOGICAL SOCIETY.

Organized June 29, 1892.—Incorporated June 7, 1893.

The meetings of the Society are held on the first and third Tuesday of each month (except June, July, August and September) at 8 P. M., in the AMERICAN MUSEUM OF NATURAL HISTORY, 77th Street and Eighth Ave.

Annual dues for Active Members, $3.00.

Members of the Society will please remit their annual dues, payable in January, to the treasurer.

Officers for the Year 1915.

President, RAYMOND C. OSBURN . . . . . Columbia University, New York.

Vice-President, H. G. BARBER . . . . . 12 Clay Ave., Roselle Park, New Jersey.

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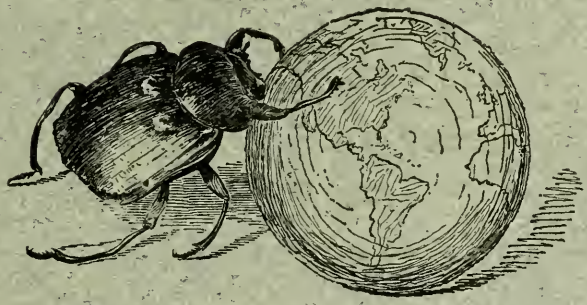

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Smithsonian Institution
SEP 25 1915

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SEP 25 1915
Natural Museum

A NEW VARIETY OF CICADA RESEMBLING C. DORSATA.

By Wm. T. Davis.

New Brighton, Staten Island, N. Y.

Thomas Say states that his *Cicada dorsata* was found near the Konza village in Missouri, which was located on the Kansas river in what is now the eastern part of the present state of Kansas. Say's original description is in part as follows: "Head and thorax varied with greenish-yellow and black; scutel blackish-chestnut, the W and X marks greenish-yellow, lateral lines of the W white near the thorax, a white line from the humerus is interrupted by the anterior lines of the X, and also in the middle between these two lines, a white spot between the two lateral lines of the X: tergum black, a dorsal line of white spots and a marginal line of white spots which are continued over the terminal segment, the lateral spot of the first and second segments is very much dilated and confluent, that of the third segment is much elongated and attenuated towards the back, a white oblique spot on the first segment each side of the dorsal line; all these white marks are pruinose. Length two inches to the tip of the hemelytra."

Some individuals are a little larger than this. We figure a male from Chetopa, southeastern Kansas. Specimens have been examined from

Nebraska, Coll. Mus. of Comp. Zoölogy, Cambridge, Mass.

Riley Co., Kans., Sept. 7, 1907, male. Collection Brooklyn Museum, N. Y.

Wakefield, Clay Co., Kans., female (J. C. Warren). Davis collection.

McPherson, Kans., Aug. 10, 1913, female. Collection Brooklyn Museum, N. Y.

Chetopa, Labette Co., Kans., July and Aug., 3 males (D. R. Beardslee). Davis collection.

Mountain Grove, Wright Co., Mo., Aug. 4, 1902, male. Davis collection.

Mountain Grove, Wright Co., Mo., female. Collection Mo. Agri. Exp. Sta.

Dallas, Texas, 3 males, 1 female. Collection Museum Comp. Zoölogy, Cambridge, Mass.

In collections there is another cicada usually associated with *dorsata,* but which is really quite distinct and which we consider to be more of a mountain form of what has been identified as Say's *C. marginata* (See this JOURNAL for March, 1915, Vol. XXIII, plate 2). This variety is altogether a whiter insect than true *marginata;* the color of the prothorax is a much lighter yellow-green, the wings show a tendency to be broader in proportion to their length, and when seen in series the head across the eyes is generally narrower.

The male genitalia are, however, alike in the two insects, and very different from those of *Cicada dorsata* as the accompanying figure will show. The prominent line of dorsal white spots has caused its association with *dorsata.* It will be noted that Say says that the ground color of the tergum in *dorsata* is black, whereas in *marginata* and the variety under consideration the segments are yellowish or brownish on their posterior margins.

It may be described as follows:

Cicada marginata var. **dealbata** new variety.

Type, male, Colorado Springs, Colorado. Davis collection.

Markings resembling those of *C. dorsata,* but *marginata* var. *dealbata* is more green in color and has less black about the central area of the pronotum. The mesonotum is marked as in *dorsata* but is more pruinose; the turgum has a dorsal line of white spots as in *dorsata,* but the sides are broadly pruinose and the posterior margin of each segment is narrowly edged with greenish yellow. Beneath both insects may be of the same color, though *dorsata* is usually much darker. The opercula are about as broad as long and broadly rounded at the tips. The fore wings in *dorsata* are oval in shape with the inner side (radius) of the costal margin blackish; the veins are heavy and

thickened, and the W-mark is prominent, whereas in *marginata* var. *dealbata* the fore wings are more acuminate in form, the costal margin is green, darkened beyond the middle of the wing and the W-mark is not conspicuous

or is wanting. One of the greatest differences between the two insects is in the genitalia. The uncus in *dorsata* viewed at full face is narrow and the piece below into which it locks is broadly notched with the extremities rounded. In var. *dealbata* the uncus is more nearly triangular in shape and the lower piece is narrowly notched with the extremities much produced. The male type of var. *dealbata* is figured.

Length of body 35 mm.; length of fore wing 46 mm.; expanse of wings 105 mm.

The following specimens are in the author's collection unless otherwise stated:

Mount Hope, Sedgwick Co., Kans., male (J. C. Warren). Collection Brooklyn Museum, N. Y.

McPherson, McPherson Co., Kans., Aug. 10, 1914, male (W. Knaus). Collection Brooklyn Museum, N. Y.

Cheyenne Co., Kans., 3,300 ft., male (F. X. Williams).

Colorado, two males.

Denver, Col., August 15, 1912, male (Oslar).

Platte Canon, Jefferson Co., Col., July 25, 1913, male; also male without date (Oslar).

Chimney Gulch Golden, Col., August, male (Oslar).

Pueblo, Pueblo Co., Col., female, Aug. 17, 1878, and female without date. Collection of Cornell University.

Colorado Springs, Col., male, Sept. 3, 1912, male (Oslar).

Durango, La Plata Co., Col., Aug. 1, 1912 male; also male without date (Oslar).

The name *Cicada marginata* was preoccupied when Say used it in 1825 by the earlier (1790) *Cicada marginata* of Olivier, now placed in the genus *Ariasa*. In 1852 Walker proposed the name *Cicada marginalis* for Say's species and if this is to be used, the name of the insect under consideration should be *Cicada marginalis*

var. *dealbata* Davis. However, *dealbata* will probably be raised to specific rank when more is known about it. Some of our eastern species, which are plainly distinct, like *linnei* and *canicularis,* have similar genitalia.

Distant in his Catalogue of the Cicadidæ (1906) mentions three synonyms of *Cicada dorsata. Cicada robertsonii* Fitch (1856) is the first of these. The original description states that the wings are "glossy-hyaline, their veins slender, green, becoming light yellow at their apices; rib of the anterior wings edged with black on its inner side, length to the tip of the closed wings in the female two inches and fifteen hundredths. From the Creek Indian territory. . . ." This is not descriptive of either *dorsata* or *marginata* var. *dealbata* and we believe that *Cicada resh* Haldeman, was probably the insect under consideration.

The next synonym mentioned by Distant is *Thopha varia* Walker. No locality was given when this species was described, but from the size and general description together with the tawny and ferruginous markings mentioned it appears to be the same as *C. dorsata* Say. The wings are said to be "almost colourless, tawny at the base, veins ferruginous, tawny towards the base, where they are partly black, very slightly clouded with tawny towards the tips; first and second cross-veins and the longitudinal vein beyond them clouded with brown." This is a good description of the wings of *Cicada dorsata.*

The third synonym is *Fidicina crassa* Walker. As in the last description no locality is mentioned, but from the general account of the insect it appears to be a *dorsata* with the pruinose markings eliminated by age. "Wings vitreous, rather broad; veins tawny, piceous towards the tips. Fore wings with first and second transverse veins very oblique, clouded with dark brown. . . ."

EXPLANATION OF PLATE XII.

Fig. 1. *Cicada dorsata* Say.
Fig. 2. *Cicada marginata* var. *dealbata* Davis.

1

2

Cicadidæ.

NEW GENERA OF CHALCIDOID HYMENOPTERA.

By A. A. GIRAULT,

WASHINGTON, D. C.

HOLANUSOMYIA new genus.

Female.—Belongs to the Ectromini. In my table of the earth's genera runs to *Holanusia* but the stigmal vein is elongate, somewhat over twice the length of the marginal, the postmarginal short, two thirds the length of the marginal, the latter nearly thrice longer than wide. Scape with its dilation broadening distad, the club a little over half the length of the funicle. Face inflexed, the frons not prominent, moderately broad. Eyes longer than the cheeks. Axillæ narrowly joined. Pronotum transverse-linear, the scutum large.

1. **Holanusomyia pulchripennis** new species. Genotype.

Female.—Length, 2.00 mm.

Dark metallic purple, the legs brownish yellow except the coxæ, the mesopleurum suffused with yellow, also the head; scape, pedicel and funicle one dusky pallid (funicle one white along one side), funicles two and three white, the rest black. Pedicel somewhat longer than wide, shorter than funicle one which is a half longer than wide, the distal three funicle joints wider than long, three subquadrate. Head and thorax finely scaly. Cephalic femora compressed. Fore wing with the following remarkable markings—An oblique, conspicuous black band across not far from the tip (with a crenulate distal margin); another clearer, rainbow-shaped stripe across from the marginal vein (running along the proximal edge of the stigmal vein), cephalad running along the submarginal vein (for about the length of the stigmal vein) to the base of the third, oblique (but oblique in an opposite direction—caudo-proximad), shorter and thicker cross-stripe but which abruptly fades near the caudal margin. The two proximal stripes form an inverted V with one arm only half the length of the other and the apex broad not acute.

Described from one female on a slide in the U. S. N. M. labelled "From No. 23. Reared from *P. citri* on Bamboo, Manila, P. I., July, '09. Compere."

Type.—Catalogue No. 19384, U. S. N. M., the female on a slide.

MERISUS Walker.

Female.—Similar to *Apiroic* of the Miscogasteridæ but the form is more slender and the solid antennal club terminates in a more distinct spine.

1. **Merisus octoguttata** new species. Female. Genotype.

Differs from *Merisus flaviventris* in having the antennæ all black, one mandible but three-dentate (other not seen), the femora are dusky and the abdomen bears the following black markings: A narrow, marginal stripe from base to base of distal sixth where its end turns mesad shortly; and five pairs of discal spots (five in a line longitudinally on each side of the meson), the first pair dots, the second pair semicircular, the third and fourth largest, oblique, subpyriform; the fifth farther laterad, connected with the marginal stripe just proximad of its end; the first is at the apex of segment two or well out from the base. Hind coxæ yellowish brown. Clypeus striate longitudinally, the face with scattered silvery pubescence. Propodeum with a fovea at cephalic margin toward the spiracle.

From one female taken by sweeping grass, Chevy Chase Lake, Maryland, April 24, 1915.

Type.—Catalogue No. 19396, U. S. N. M., the female on a tag, the head and a hind tibia on a slide.

Genus **TAFTIA** Ashmead.

The club is solid, the fore wings embrowned but hyaline caudad of the proximal half of the submarginal vein. Head rounded, the face inflexed. Mandibles acute. The dorsal body may be washed more or less with metallic purple. Brown. Middle tibial spur short. Costal cell of the fore wing broad. A female in the U. S. N. M. on a slide labelled "No. 18 From *Pscudococcus citri* on Bamboo, Manila, P. I., Calif. State Insectary." Compared with types. This specimen bore two black, long, clavate appendages on the face mesad below the middle. I could not find these organs on the types and presume they have been broken off.

MIRASTYMACHUS new genus of the Ectromini.

1. **Mirastymachus europaeus** new species. Genotype.

Female.—Length, 1.00 mm.

Differs from the genotype of *Astymachus* in having the ovipositor much shorter and nonexserted, the antennal club black, also funicles one to three (only funicle one in the named species), the fore wings do not have a round black spot over the marginal vein as in the named species, the club is distinctly three-jointed. The ovipositor is shorter, as in *Xanthoencyrtus,* the scape compressed but not dilated. Form as in *Xanthoencyrtus.* The postmarginal vein is present but short.

The male bears nine-jointed antennæ like the male of the named species but the joints of the funicle are all much longer, the solid club still longer,

being over twice the length of funicle two which is shortest, somewhat longer than wide, longer than the pedicel; funicle six longest, twice longer than wide and along one side bearing a row of remarkable sensory organs like minute clavate, conidial spores (absent in the other species). Both species bear a long thoracic phragma. In *Astymachus japonicus,* the marginal vein is twice longer than wide, subequal to the stigmal; here that vein is sub-punctiform, no longer than the evident postmarginal, the stigmal much longer.

The females are golden yellow, the males dusky yellow (including the appendages but the legs a little paler, the wings hyaline); funicles four to six in the female white.

. From two pairs on a slide in the U. S. N. M. labelled "Par. of *Dactylopius* mealybug-like form, possibly *Pseudococcus sp.* (Received labelled 'unknown eggs.' Reared May 19, 1906. Denmark, J. P. Kryger.) The wings of the females were shrivelled. The locality is Vangede Mose.

The genus *Astymachus* Howard differs from *Xanthoencyrtus* Ashmead only in having the mandibles acutely tridentate, the marginal vein twice longer than wide, the postmarginal vein absent and the ovipositor distinctly longer (yet inserted distad of the middle) and distinctly extruded. Also the face is more inflexed, the scape slenderer. *Mirastymachus* differs from *Xanthoencyrtus* in having the club three-jointed. Types of *Astymachus japonicus* Howard examined and type of *Xanthoencyrtus nigroclavatus* Ashmead.

Types.—Catalogue No. 19398, U. S. N. M., two pairs on a slide.

2. **Mirastymachus americanus** new species.

Female.—Length, 1.15 mm. Dusky, the wings hyaline, the legs dusky yellow; club and funicles one to three, black, funicle six, bulb and middle of scape and base of pedicel darker than funicles four and five. The oblique hairless line of the fore wing is broader than in the genotype and the funicle joints are larger, one somewhat longer than wide. Otherwise about the same.

Described from one female taken April 26, 1915, by sweeping in the forest, District of Columbia.

Type.—Catalogue No. 19399, U. S. N. M., the female on a slide.

EPICERCHYSIUS new genus.

Female.—In my table of the earth's encyrtine genera runs to *Chestomorpha* Ashmead, the abdomen being compressed but it is as long as the thorax, the ovipositor exerted for a third (or nearly) of its length. The head is a little longer than wide (cephalic aspect),

the frons moderately broad, the labrum conspicuous, the eyes very long, reaching nearly to the mouth, narrowing ventrad, long-reniform, the head lenticular but the short scrobes are distinct, not joined above. Mandibles with three distinct teeth, the second a little the longest. Antennæ long and slender, the scape reaching the ocelli, the funicle joints all nearly thrice longer than wide, the club blunt at apex, somewhat wider than the funicle but only about a third of its length. Hind tibial spurs double, one of them long and slender, the other of normal length. Marginal vein two and a half times longer than wide, slightly longer than the postmarginal or stigmal. Body with the general build of *Cerchysius*. Axillæ joined at meson. Scutum large, subquadrate.

1. **Epicerchysius xanthipes** new species.

Female.—Length, 1.75 mm.

Metallic green, the scutellum rosaceous coppery, the legs and antennæ yellow except the middle tibiæ which are fuscous above, the caudal femur above at tip and the caudal tibiæ which are metallic purple from end to end. Fore wing with a distinct cross-stripe of fuscous from the marginal and postmarginal veins, and which is of moderate width, divided by a narrow hyaline streak just caudad of the middle and bevelled off cephalo-distad to the apex of the postmarginal vein. Pedicel over twice longer than wide at apex, nearly as long as funicle one. Extreme tip of exserted portion of the ovipositor white. Thorax very finely scaly, the scutum and scutellum with numerous minute setigerous punctures, the clothing white and short. Dorsolateral aspect of propodeum with white pubescence, glabrous from thence to meson.

Described from one female on a tag in the U. S. N. M. labelled "from cotton boll. 708. E. S. Tucker, March 1909, Arlington, Tex."

Type.—Catalogue No. 19400, U. S. N. M., the above specimen plus a slide bearing the head, fore wing and a hind tibia.

ANAGYRELLA new genus.

Female.—In my table to the earth's encyrtine genera runs to *Leurocerus* Crawford but the postmarginal and stigmal veins are very elongate and subequal, the marginal punctiform. The scape is greatly, foliaceously dilated, the flagellum clavate, the solid club short and thick, obliquely truncate from near the apex, nearly as long as the funicle whose joints are much wider than long, lengthening and widening distad, not compressed. Hind tibial spurs double, one spur

small. Frons moderately broad, not prominent, the face inflexed, the scrobes forming a deep semicircle. Axillæ distinctly separated for some little distance. Thorax rather flat, the scutum wider than long, a little shorter at meson than the triangular scutellum which extends to the base of the abdomen. Pronotum transverse. Abdomen no longer than the thorax, the ovipositor neither exserted nor prominent. One ring-joint. Legs normal. Cheeks distinct. Mandibles with the first and third teeth equal, the middle distinctly longer, over twice as long, acute.

Somewhat like *Euryrhopalus* Howard (which has very large eyes but the cheeks are quite long) but the frons is much broader, the postmarginal and stigmal veins distinctly longer, the scape dilated and so on.

1. **Anagyrella corvina** new species.

Female.—Length, 1.15 mm.

Dark purplish black, the fore wings smoky to apex from a little distad of the middle of the submarginal vein, the rather broad costal cell infuscated to base and also the caudal margin. Tarsi yellow except the distal joint. Pedicel somewhat longer than wide at apex; funicles one to two subequal, four no longer than wide. Oblique hairless line of the fore wing with a half dozen complete lines of cilia proximad of it. Head and thorax shining but very delicately scaly, the pubescence not conspicuous.

Described from two females on tags labelled "State Insectary, Calif. 675. Ex. *Pseudococcus*. B." Fresno, California.

Types.—Catalogue No. 19401, U. S. N. M., the above specimens on tags, the head, hind tibia and fore wings on a slide. One female a paratype.

METALLONOIDEA new subgenus of the Encyrtini.

Female.—In my table to the earth's genera runs to *Holcothorax* Mayr (*partim*) and *Metalloncila* Girault and close to *Rhopus*. Differs from the latter in having the club three-jointed, not solid, the color metallic, the frons somewhat narrower, the marginal cilia normal, the venation different (in *Rhopus*, the venation does not attain the costa, the submarginal vein not forking at all, very narrow—*R. testaceus*), the mandibles in *Rhopus* truncate as in *Eucomys*. From *Holcothorax testaceipes* Ratzeburg at least in color and in venation according to Mayr (*testaceipes* may be *Rhopus*). From *Metallo-*

nella in venation, the marginal vein being twice longer than wide, not punctiform, the postmarginal and stigmal veins subequal, each a little shorter than the marginal. Differs from *Psylledontus* Crawford in having the club three-jointed, the body flatter and weaker, the marginal vein not punctiform, the postmarginal vein distinct (in *P. insidiosus* the mandibles are weakly tridentate, the first two teeth obtuse, the third truncate). Resembles closely *Encyrtomyia* Girault of the Eucomini. Ovipositor very slightly extruded. Axillæ joined narrowly. The marginal cilia of the fore wing in *Rhopus testaceus* are not long but only a little longer than normal.

The present tribal arrangements will break down I am sure but under them this is a new genus; the dentation of the mandibles should be considered not more than of subgeneric value and this form will rank under *Encyrtomyia* as a consequence.

1. **Metallonoidea brittanica** new species.

Female.—Length, 0.55 mm.

Very dark metallic green, the wings hyaline, the venation pale dusky yellow. Tarsi, tips of tibiæ, middle knees broadly, cephalic knees and base of middle femur, white. Body very finely scaly. Pedicel a half longer than wide, much longer than any of the funicle joints of which one and five are largest, five wider than one, wider than long, one slightly longer than wide, two and three subequal, shortest, four larger than three, smaller than five. Hairless line rather narrow, with four or five lines of cilia proximad of it. Marginal vein with slight infuscation under it. Scutellum extending to the base of the abdomen.

Described from one female on a tag, reared from *Lepidosaphes ulmi*, Manchester, England, Letter October 30, 1914. A. D. Imms, Manchester University. "Sp. A."

Type.—Catalogue No. 19402, U. S. N. M., the female on a tag, the head and a fore wing on a slide.

PARAHOMALOPODA new genus (Encyrtini).

Female.—In my table to the earth's genera runs to *Homalopoda* Howard but differs in lacking the clump of hairs from the apex of the scutellum and the pair of clumps from the occiput. Also the postmarginal vein is as long as the stigmal which is two thirds (or a little less) the length of the marginal. Also the mandibles bear four small, subacute teeth and the ovipositor is extruded distinctly but shortly (more so than in the genotype of the named genus). Differs

from *Plagiomerus* Crawford in lacking the scutellar hair clusters. The frons is not prominent.

1. **Parahomalopoda peruviensis** new species. Genotype.

Female.—Length, 1.15 mm. excluding the ovipositor which is a little over a fourth of the length of the abdomen. Dark metallic green, the wings hyaline but infuscated slightly under the marginal and stigmal veins, the venation dusky yellowish. Antennæ yellow suffused with dusky, the pedicel dusky except at tip. Tarsi white except the last joint, also the base and distal third of caudal tibiæ, middle knees broadly, middle tibiæ excepting a broad cinctus a short distance out from base. Axillae slightly separated. Funicles three and four subequal, large, a little longer than wide, one and two subequal, each a half shorter than three or four. Club wider and a little longer than the funicle. Marginal vein thrice longer than wide. Pedicel nearly twice longer than wide. Body scaly.

From one female in the U. S. N. M., on a slide labelled "1144° 3a. Gn. 1. Sp. 2. Corcomba, May 17, 1910—Townsend." Peru.

Type.—Catalogue No. 19403, U. S. N. M., the above specimen.

In *Pseudhomalopoda prima* the scape is dilated convexly distad. The above species differs from *Plagiomerus diaspidis* Crawford only in having a fuscous patch under the marginal vein and the scaly sculpture of the thorax is finer. In *Plagiomerus* there is a smaller, second hair cluster, one on each side of the mesal one.

PSEUDHOMALOPODA new genus.

Female.—Differs from *Homalopoda* in having the antennæ short and thick, the scape with a small convex dilation ventrad at apex, the funicle joints all much wider than long, the pedicel and funicle subcompressed.

1. **Pseudhomalopoda prima** new species. Genotype. Female.

Length, 1.00 mm.

Differs from the genotype of *Homalopoda* in having the middle tibia except at base golden yellow, the ovipositor is not shortly extruded as in that species and the wings bear the following different pattern: The large naked hyaline area just cephalad of the venation is larger, larger than the one farther distad of it (along cephalic margin), the latter cone-shaped (not crescentic as in the genotype) with the smallest end at the cephalic margin, this end narrow; on the caudal half of the wing there are not three spots as in the genotype but only two (the proximal one largest, both paired with the two cephalic spots) and these are larger than the corresponding two in the other species (which bears an additional spot farther proximad near

the hairless line). Marginal vein black, the stigmal pale, the former over thrice longer than wide, about twice the length of the stigmal. Funicle joints much wider than long, one and two subannular. Pedicel subcompressed, short. Frons moderate, narrower than in the other species, prominent, the head rounded, the face much inflexed. Mandibles tridentate but the third tooth is but shallowly separated from the second and is truncate. In the fore wing there is also a small round dot just at apex (but not at the margin).

Described from four females reared from *Chrysomphalus aonidum* and *Aleurocanthus woglami,* Kingston, Jamaica, L. F. Ashby, January 20, 1914.

Types.—Catalogue No. 19405, U. S. N. M., four females on tags plus a slide bearing a fore wing and head (also antennæ of *Homalopoda cristata* Howard). Three of the females are paratypes.

In this genus and *Homalopoda* there are two slender black clumps of hairs from the apex of the scutellum and another from the upper occiput near each eye.

PARALEUROCERUS new genus.

Female.—In my table of the earth's encyrtine genera runs to *Leurocerοides* Girault but differs in the following particulars. The antennæ are inserted nearer the mouth border, the club is wider than the funicle, the scape is rather greatly dilated ventrad and the postmarginal and stigmal veins are subequal, each somewhat longer than the marginal which is slightly longer than wide. Agrees otherwise with the original description of that genus.

1. **Paraleurocerus bicoloripes** new species. Genotype.

Female.—Length, 0.80 mm.

Dark metallic green, the axillæ, scutellum and the body distad black green, the wings hyaline, the venation pale yellow; knees, tips of tibiæ and the tarsi white, the middle tibiæ white along distal two thirds (thus with a broad, concolorous band some distance below the knee); caudal knees nearly all concolorous; all of middle tarsus white. Bulla and apex of scape rather broadly, white, also one side of funicles one to three, most of funicle six and both sides of four and five. Pedicel longer than any of the funicle joints, all the latter subquadrate but six over twice the size of one, the joints enlarging in succession; club truncate at apex, slightly over half the length of the funicle; pedicel slightly longer than wide at apex. Third tooth of mandibles broader and slightly longer than the others. Caudal wings with about fifteen lines of discal cilia where broadest; hairless line of fore wing with about three complete lines of cilia proximad of it, followed by numerous

half complete lines. Body finely scaly, the dorsal thorax sparsely pubescent. Axillæ slightly separated. Lateral ocellus slightly separated from the eyes. Two other teeth of mandibles acute. Distal joint of cephalic and caudal tarsi black.

The males are similar but the flagellum is distinctly clothed with longer hairs, the pedicel is subglobular, no longer than funicle six which is slightly shorter than one, the latter somewhat longer than wide, the scape and pedicel concolorous, rest of antennæ dusky yellowish.

Described from two males, four females reared from a cherry leaf miner (*Lithocelletis* species), Wood's Holl, Massachusetts, July 9, 1914 (J. T. Patterson).

Types.—Catalogue No. 19406, U. S. N. M., a pair on a tag and another on a slide with heads.

NEW ASIAN GALL MIDGES.

By E. P. Felt,

Albany, N. Y.

The species described below are particularly interesting because of the addition to our knowledge of zoöphagous forms, some of which may prove to be of considerable economic importance. A study of the collections forwarded by Prof. Rutherford showed that he had reared *Diadiplosis coccidivora* Felt from *Pseudococcus* species on *Tephrosia hookeriana,* and also from the same genus on cocoanut and cocoa, indicating that this species is rather common and abundant. The records show the occurrence of the peculiar American genera *Didactylomyia* and *Dentifibulua* in Asia and the presence in that section of the world of *Arthrocnodax,* a genus previously known only from Europe and America. The zoöphagous species have considerable in common, structurally speaking, and the wide distribution of some of these highly specialized forms is certainly worthy of note.

Didactylomyia ceylanica new species.

The striking midges described below were taken in a bungalow at light by A. Rutherford, Peradeniya, Ceylon, and forwarded under date of June 8, 1914. The flagellate antennal segments are relatively much less prolonged than in the type species, though in other re-

spects there is a fairly close analogy and the species is therefore referred to this genus.

Male.—Length 1.4 mm. Antennæ extending to the third abdominal segment, sparsely haired, yellowish brown; fifteen segments, the fifth with a stem one-fourth the length of the subcylindric basal enlargement, which latter has a length two and one-half times its diameter and a broad subapical band of long, slender setæ; terminal segment greatly produced, the finger-like apical processes having a length three-fourths the length of the basal enlargement, which latter is somewhat fusiform and has a length about four times its diameter. Palpi: first segment irregular with a length over twice its diameter, the second a little longer and broader, the third as long as the second, more slender, the fourth nearly one-half longer than the third, somewhat dilated. Eyes black, holoptic, the mouth-parts prolonged and with a length equal to half the diameter of the head. Mesonotum reddish brown. Scutellum and postscutellum yellowish brown. Abdomen fuscous yellowish. Wings hyaline, the crossvein distinct, though somewhat rudimentary at the juncture with subcosta. Halteres and coxæ yellowish. Legs mostly pale straw. Genitalia: basal clasp segment long, slender, strongly curved; terminal clasp segment greatly produced, very slender and about one-half longer than the basal clasp segment; dorsal plate short, roundly truncate and thickly clothed apically with stout, recurved spines; ventral plate apparently reduced to a pair of harpoid organs, the basal portion swollen, the distal half slender, finger-like, smooth; harpes similar though not swollen basally; style long, slender, tapering, slightly expanded apically.

Female.—Length 1.5 mm. Antennæ extending to the fourth abdominal segment, sparsely haired, yellowish brown; fifteen segments, the fifth with a stem one-fourth the length of the cylindric basal enlargement, which latter has a length three times its diameter. There is a scattering subapical band of strongly curved setæ; terminal segment produced, the finger-like apical processes setose and about half the length of the cylindric basal enlargement, which latter has a length four times its diameter. Palpi: first segment irregular, the second one-half longer, more slender, the third a little longer and broader than the second, the fourth longer and more dilated than the third; claws slender, strongly curved, unidentate, the pulvilli rudimentary. Ovipositor short, the terminal lobes broadly oval, narrowly rounded apically and thickly setose. Other characters practically as in the male.

Both sexes were captured at light, and as they present substantial agreement, aside from sexual differences, in color and structural characters, they are referred to the same species. Type Cecid. a2581.

Microperrisia pulvinariæ new species.

This species was received from H. S. Smith of the California State Commission of Horticulture and labeled as having been reared

from *Pulvinaria* on citrus collected in Manila, P. I. The species is tentatively referred to the above named genus, particularly as its habits differ from the normal *Rhabdophaga* to which it is closely related.

Male.—Length 1.2 mm. Antennæ probably nearly as long as the body, rather thickly haired, dark brown, yellowish basally; at least twelve and probably fourteen segments, the fifth with the stem one-half the length of the cylindric basal enlargement, which latter has a length about twice its diameter and a thick subapical whorl of long, stout setæ. Palpi: first segment irregular, the second with a length nearly three times its diameter, the third a little shorter, more slender, the fourth over one-half longer than the third and somewhat dilated. Mesonotum dark brown, the submedian lines, scutellum and postscutellum yellowish. Abdomen pale yellowish. Wings hyaline, the third vein uniting with the margin at the apex of the wing. Halteres and legs a nearly uniform yellowish straw. Claws long, strongly curved, unidentate, the pulvilli rudimentary. Genitalia; basal clasp segment short, stout; terminal clasp segment somewhat reduced, swollen basally and tapering to a heavily spurred apex; dorsal plate deeply and triangularly incised, the lobes tapering and irregularly rounded apically; ventral plate long, broad, broadly rounded distally.

Female.—Length 1.2 mm. Antennæ nearly as long as the body, sparsely haired, probably fourteen segments, the fifth with a stem one-fifth the length of the cylindric basal enlargement, which latter has a length a little over twice its diameter and a moderately thick subapical whorl of long, curved setæ. Ovipositor with a length about one-fourth that of the abdomen, the terminal lobes narrowly oval, tapering distally and sparsely setose, otherwise nearly as in the male.

Type Cecid, a2494.

Dentifibula ceylanica new species.

The one insect described below was reared by Prof. A. Rutherford, Royal Botanic Gardens, Peradeniya, Ceylon, June 8, 1914, from twigs of *Cassia alata* infested with a species of *Hemichionaspis*. This species is distinguished from *D. obtusilobæ* by the relatively shorter basal portion of the stem of the fifth antennal segment and the nearly straight inner margin of the apical lobe of the basal clasp segment. The two Indian species of *Dentifibula* are readily separated from American forms by the shorter and relatively broader apical lobe of the basal clasp segment.

Male.—Length 1 mm. Antennæ as long as the body, sparsely haired, pale yellowish; fourteen segments, the fifth having the stems with a length

one and one-half and three and one-half times their diameters, respectively, the enlargements subglobose. Palpi: first segment subquadrate, the second a little longer, more slender, the third a little longer and more slender than the second. Mesonotum reddish yellow. Scutellum, postscutellum and abdomen mostly yellowish. Wings faintly spotted at the fork of the fifth vein. Halteres and legs pale straw. Claws moderately stout, strongly curved, the pulvilli as long as the claws. Genitalia: basal clasp segment rather broad and with a broadly triangular apical process, the length of the latter about equal to its basal width; the inner margin being nearly straight; terminal clasp segment swollen basally, enlarged apically and somewhat curved. Other structures indistinct in the preparation.

Type Cecid. a2580.

Dentifibula obtusilobæ new species.

The male characterized below was reared by Prof. A. Rutherford of the Royal Botanic Gardens, Peradeniya, Ceylon, September 21, 1914, from *Piper nigrum* infested with *Hemichionaspis aspidistræ* and a few specimens of *Aspidiotus lataniæ*. The midge is probably an enemy of the first named scale insect. It may be most easily separated from the known American species by the relatively shorter and much stouter apical process of the basal clasp segment.

Male.—Length .75 mm. Antennæ probably one-half longer than the body, sparsely haired, dark brown, the stems whitish transparent, presumably fourteen segments, the fifth having the stems with a length two and one-half and four times their diameters, respectively; circumfili well developed and extending nearly to the base of the next enlargement; terminal segments missing. Palpi: first segment narrowly oval, the second a little longer, rectangular, the third somewhat reduced, fusiform. Face and thorax yellowish, the abdomen yellowish fuscous. Halteres whitish transparent, the legs mostly pale straw, the tarsi mostly dark brown; claws simple, evenly curved, the pulvilli as long as the claws. Genitalia: basal clasp segment moderately long, stout, and with a stout, triangular curved apical process, the latter with a length about equal to its basal width and minutely dentate apically; terminal clasp segment short, stout, strongly curved, capitate. Other structures indistinct in the preparation.

Female.—Length .75 mm. Antennæ about as long as the body, sparsely haired, dark brown, the stems whitish transparent; fourteen segments, the fifth with a stem one-fourth longer than the cylindric basal enlargement, which latter has a length about twice its diameter; terminal segment reduced, with a length about three times its diameter and broadly rounded apically. Abdomen fuscous yellowish, fuscous basally, the ovipositor short, the lobes narrowly oval and thickly setose.

Type Cecid. a2588.

Mycodiplosis simulacri new species.

The delicate midge described below was reared July 1, 1914, from larvæ feeding probably on fungous spores by Prof. A. Rutherford, Royal Botanic Gardens, Peradeniya, Ceylon.

Male.—Length 1.2 mm. Antennæ probably one-half longer than the body, sparsely haired, light reddish brown; fourteen segments the fifth having the stems subequal, each with a length about one-half greater than its diameter. A coarse whorl of long, stout setæ occurs on the globular basal enlargement and the somewhat pyriform distal enlargement, the latter with a length one-fourth greater than its diameter; circumfili moderately long, stout. Palpi: first segment short, subquadrate, the second with a length over three times its diameter, the third a little shorter than the second, more slender, the fourth as long as the third and more slender. Body yellowish white, except for the minute yellowish brown mesothoracic sclerites. Halteres whitish transparent. Wings hyaline. Legs a uniform pale straw; claws stout, strongly curved, the anterior unidentate, the pulvilli rudimentary. Genitalia; basal clasp segment moderately long, stout; terminal clasp segment a little longer than the basal clasp segment, swollen basally and slender; dorsal plate short, deeply and roundly emarginate, the lobes short, obtuse. Other structures indistinct in the preparation.

Type Cecid. a2591.

TABLE FOR SEPARATION OF MALES OF DIADIPLOSIS:

a. Basal portion of the stem of the fifth antennal segment with a length plainly greater than its diameter.

b. Stems of the fifth antennal segment plainly unequal, having a length, respectively, one-half greater and twice the diameter; third palpal segment with a length twice that of the second; abdomen dark red; basal clasp segment greatly swollen; ventral plate broadly and roundly emarginate .....*cocci* Felt, a2128.

bb. Stems of the fifth antennal segment nearly equal, each with a length greater than its diameter, the abdomen yellowish.

c. Stems of the fifth antennal segment with a length one-fourth greater than their diameter, the circumfili each with about eight loops, the terminal clasp segment reduced, swollen basally, the harpes with long setæ ....*coccidivora* Felt, a2486

cc. Stems of the fifth antennal segment with a length one-half greater than their diameter, the circumfili each with fourteen to sixteen loops, the terminal clasp segment long, slender, not conspicuously swollen basally, the harpes inconspicuous. *hirticornis* n. sp., a2618.

aa. Basal portion of the stem of the fifth antennal segment with a length equal its diameter or less; ventral plate roundly emarginate.

b. Stems of the fifth antennal segment plainly unequal, with a length equal and twice their diameters, respectively; circumfili with seven or eight loops; third palpal segment with a length twice the second; abdomen yellowish brown; basal clasp segment constricted basally; ventral plate lobes not plainly divergent.....*smithi* n. sp., a2495a.

bb. Stems of the fifth antennal segment nearly equal, with a length one-third and one-half their diameters, respectively; circumfili with fifteen loops; third palpal segment a little longer than the second; abdomen dark brown; basal clasp segment uniformly stout; ventral plate lobes divergent.....*buscki* Felt, C. 1529a.

Diadiplosis smithi new species.

The species described below was received through the courtesy of Mr. H. S. Smith of the California State Commission of Horticulture, accompanied by the statement that the insects had been reared from cocoons produced by larvæ feeding upon a *Pulvinaria* on citrus at Manila, P. I. This species is quite distinct from earlier characterized forms and is therefore described as new.

Male.—Length .8 mm. Antennæ one-half longer than the body, thickly haired, light straw; fourteen segments, the fifth with stems as long and twice the length of their diameters, respectively; the circumfili moderately long and stout, and with but six or eight loops to a filum. Palpi: first segment short, irregular, the second subquadrate, with a length about twice its diameter, the third slender and more than twice the length of the second. Mesonotum dark brown, the submedian lines, the posterior median area, the scutellum and postscutellum yellowish orange. Abdomen yellowish brown, yellowish basally and apically, the genitalia slightly fuscous. Wings hyaline. Halteres, coxæ and femora basally yellowish transparent, the distal portion of femora, tibiæ and tarsi light straw. Claws slender, strongly curved, unidentate, the pulvilli about half the length of the claws. Genitalia: basal clasp segment moderately long, stout; terminal clasp segment greatly reduced and with a stout spur apically; dorsal plate long, deeply and narrowly emarginate, the lobes tapering and rather thickly setose apically; ventral plate rather long, tapering, broadly and roundly emarginate, the distal margin setose.

Female.—Length 2 mm. Antennæ nearly as long as the body, sparsely haired, probably light straw; fourteen segments, the fifth with a stem one-fourth the length of the cylindric basal enlargement, which latter has a length about two and one-fourth times its diameter. Palpi practically as in the male, except that both the second and third segments appear to be relatively somewhat longer. Ovipositor short, the terminal lobes roundly oval and thickly setose.

Type Cecid. a2495a.

Diadiplosis hirticornis new species.

The midges described below were received under date of April 19, 1915, from Mr. H. S. Smith, Superintendent of the State Insectary, Sacramento, Cal., accompanied by the statement that they had been reared from mealy bugs from Japan, and labeled Calif. 799, Ex. *Pseudococcus vapor*. This species is quite different from other known forms referred to this genus.

Male.—Length .9 mm. Antennæ one-half longer than the body, thickly haired, light brown; fourteen segments, the fifth having the two portions of the stem subequal, each with a length about one-half greater than the diameter, the circumfili moderately long, the loops thick, there being fourteen to sixteen to each filum, the terminal segment somewhat reduced, the basal portion of the stem with a length about twice its diameter, the distal enlargement subcylindric, with a length one-half greater than its diameter, almost truncate apically, the terminal appendage rudimentary. Palpi: the first segment broadly oval, the second narrowly oval, a little shorter, the third one-half longer than the second, more slender. Mesonotum reddish brown, the sparsely haired submedian lines yellowish. Scutellum, postscutellum and pleuræ fuscous yellowish. Abdomen mostly fuscous yellowish, the third abdominal segment with a fuscous spot dorsally, the genitalia a little darker. Wings hyaline, the third vein uniting with the margin at the apex of the wing. Halteres and coxæ pale yellowish; legs mostly a nearly uniform dark straw, the two distal tarsal segments yellowish white; claws slender, strongly curved, the anterior unidentate, the pulvilli about half the length of the claws. Genitalia: basal clasp segment rather slender, long; terminal clasp segment long, tapering to a strongly recurved, chitinous claw; dorsal plate long, broad, deeply and triangularly emarginate, the lobes diverging, rather thickly clothed with short setæ; ventral plate long, spatulate, subtruncate, distally slightly emarginate; style short, tapering, acute distally.

Female.—Length 1.3 mm. Antennæ about three-fourths the length of the body, sparsely haired, pale brownish yellow; fourteen segments, the fifth with a stem one-fourth the length of the cylindric basal enlargement, which latter has a length about twice its diameter; terminal segment subcylindric, with a length two and one-half to three times its diameter, tapering abruptly to a short, broadly conical apical process. Mesonotum yellowish brown. Scutellum and postscutellum fuscous yellowish. Abdomen mostly fuscous yellowish, the dorsum of the third and fourth segments mesially, dark brown. Ovipositor short, the terminal lobes narrowly oval and rather thickly clothed with long setæ. Other characters nearly as in the male.

Type Cecid. a2618.

XIPHODIPLOSIS new genus.

This genus is easily distinguished from all of the trifili having triarticulate palpi, by the enormously produced, somewhat sword-shaped terminal clasp segment. Owing to its habits it is provisionally associated with *Diadiplosis* Felt, though it may fall in the series with *Kalodiplosis* Felt, since the material at hand has not enabled use to ascertain the structure of the claws. The type of this species is *X. fulva* n. sp.

Xiphodiplosis fulva new species.

The midges were reared August 15, 1914, from *Saissetia nigra* on dahlia by Prof. A. Rutherford, Royal Botanic Gardens, Peradeniya, Ceylon.

Larva.—Length 1.75 mm., stout. Head short, broad, the antennæ moderately short, stout, biarticulate; breastbone dark brown, expanded apically and strongly tridentate. Skin smooth, posterior extremity broadly rounded and rather deeply incised.

Male.—Length 1 mm. Antennæ probably as long as the body, sparsely haired, light brown; probably fourteen segments, the third and fourth slightly fused, the fourth having the stems with a length one and one-half and three times their diameters, respectively; basal enlargement subglobose, distal enlargement elongate, pyriform, with a length fully twice its diameter and a slight constriction near the basal third. The loops of the three circumfili rather numerous, moderately stout and extending nearly to the apex of the adjacent portion of the stem; terminal segment missing. Palpi: first segment irregular, the second with a length about three times its diameter, the third as long as the second, somewhat dilated. Eyes holoptic. Mesonotum, scutellum and postscutellum fuscous yellowish brown.

Abdomen yellowish brown. Wings hyaline. Halteres pale yellowish. Coxæ and femora yellowish. Genitalia: basal clasp segment relatively short, stout, with a length about one-half greater than its diameter and a large, triangularly obtuse lobe at the internal basal angle; terminal clasp segment greatly produced, slender, slightly curved and with a length about twice that of the basal clasp segment; dorsal plate long, slender, deeply and narrowly incised, the lobes relatively slender and narrowly rounded apically; ventral plate longer than the dorsal plate, moderately broad and narrowly rounded apically.

Type Cecid. a2590.

Arthrocnodax rutherfordi new species.

The midges described below were received from Prof. A. Rutherford, Royal Botanic Gardens, Peradeniya, Ceylon, under date of

June 8, 1914, and reported as having been reared from leaves of *Melia azedarach* infested with *Tetranychus* species.

Male.—Length .6 mm. Antennæ a little longer than the body, thickly haired, yellowish brown; fourteen segments, the fifth having the stems with a length one and one-half and two times their diameters, respectively; basal enlargement subglobose, distal enlargement pyriform, with a length equal to its diameter. Palpi: indistinct in the preparation. Mesonotum dark reddish brown. Scutellum and postscutellum yellowish. Abdomen a variable fuscous yellowish. Halteres pale yellowish. Legs a variable pale straw. Claws slender, evenly curved, the pulvilli nearly as long as the claws. Genitalia: basal clasp segment rather stout; terminal clasp segment long, slender; dorsal plate deeply and triangularly emarginate, the ventral plate short, broadly rounded apically.

Type Cecid. a2579.

Arthrocnodax walkeriana new species.

The species characterized below was received from Prof. A. Rutherford, Royal Botanic Gardens, Peradeniya, Ceylon, accompanied by the statement that it was reared June 8, 1914, from a species of *Pseudococcus* on coffee. There have been no species of this genus described from that part of the world, and we therefore take pleasure in characterizing this midge. Prof. Rutherford transmitted specimens of apparently the same species reared at the same date from *Walkeriana* species, probably *kandyense*.

Male.—Length .1 mm. Antennæ as long as the body, thickly haired, yellowish brown; fourteen segments, the stems of the fifth antennal segment having a length one and one-fourth and one and one-half times their diameter, respectively; basal enlargement with a length about half its diameters, the distal enlargement globose, with a length three-fourths its diameter, terminal segment slightly produced, the basal portion of the stem with a length three times its diameter, the distal enlargement with a length about twice its diameter and with an equally long, fingerlike process apically. Palpi: first segment with a length twice its diameter, the second quadrate, the third narrowly oval, the fourth one-half longer than the third, more slender. Mesonotum reddish brown. Scutellum and postscutellum yellowish. Abdomen a variable yellowish or yellowish orange. Halteres and legs mostly pale straw, the distal tarsal segments darker. Claws slender, evenly curved, the pulvilli nearly as long as the claws. Genitalia: basal clasp segment rather long, slender; terminal clasp segment swollen basally; dorsal plate short, deeply and broadly emarginate, the lobes diverging and narrowly rounded apically; ventral plate long, rather broad, broadly rounded apically.

Female.—Length 1.25 mm. Antennæ extending to the fifth abdominal segment, sparsely haired, pale yellowish; fourteen segments, the fifth with a stem one-half the length of the subcylindric basal enlargement, which latter has a length about twice its diameter; terminal segment slightly produced, with a length three times its diameter, broadly rounded apically. Palpi: first as long as the second, the fourth a little longer than the third. Abdomen reddish basally, yellowish apically. Ovipositor short, the lobes narrowly oval and thickly clothed with long, stout setæ. Other characters nearly as in the male.

Type Cecid. a2578.

Lowiola costata new species.

The midges described below and tentatively referred to this genus were received from Prof. A. Rutherford, Royal Botanic Gardens, Peradeniya, Ceylon, June 8, 1914, and taken by him on a spider's web. The midges had no difficuly in leaving the web and the spiders did not seem to feed upon them.

Female.—Length 1.75 mm. Antennæ extending to the fifth abdominal segment, sparsely haired, yellowish orange; fourteen segments, the fifth with a stem one-half the length of the cylindric basal enlargement, which latter has a length about twice its diameter and is girdled near the middle and subapically by broad, rather heavy, low circumfili; terminal segment produced, the basal enlargement with a length four times its diameter and distally with a bulbous appendage, the latter separated from the enlargement by a distinct, rather smooth stem and with an ovoid basal enlargement, the distal portion being finger-like and with a length three times its diameter. Palpi: the first segment irregularly subquadrate, the second rather broad, with a length four times its diameter, the third as long as the second, more slender; mouth-parts produced, with a length fully one-half the diameter of the head. The maxillæ thickly and transversely costate. Eyes holoptic, black. Mesonotum reddish brown. Scutellum and postscutellum yellowish brown. Abdomen fuscous yellowish, the yellowish ovipositor with a length about half that of the abdomen, the terminal lobes long, indistinctly biarticulate, the distal portion narrowly lanceolate and sparsely setose. Wings hyaline, the third vein uniting with the margin well beyond the apex. Halteres pale yellowish. Coxæ fuscous yellowish. Legs mostly pale straw. The simple claws strongly curved, the pulvilli rudimentary.

Type Cecid. a2582.

ANDRODIPLOSIS new genus.

The genus is allied to *Diplecus* Kieff., which it resembles very closely in a superficial manner and from which it may be separated by the distinctly binodose basal enlargements of the flagellate an-

tennal segments in the female, the absence of hairs covering the entire surface of the enlargement, the well developed claws and pulvilli, and the short lobes of the ovipositor. The wings are probably not long-haired as described by Kieffer for *Diplecus*. Type *A. coccidivora* n. sp.

Androdiplosis coccidivora new species.

The one female obtained was reared by Prof. A. Rutherford, Royal Botanic Gardens, Peradeniya, Ceylon, from *Aspidiotus* or *Chrysomphalus* species, probably *C. orientalis* News., on *Limonia alata*.

Female.—Length 1.2 mm. Antennæ probably yellow, as long as the body, sparsely haired, the basal enlargement light brown and distinctly binodose, the constriction being as well marked as in many male Diplosids, smooth, and with a length approximately half its diameter. The whitish, smooth, transparent stem as long as the remainder of the segment, each enlargement with an irregular whorl of stout setæ near the middle and subapically a circumfilum, the loops of the latter stout and with a length approximating the diameter of the enlargement; terminal segment wanting. Palpi: first segment irregular, the second with a length one-half greater than its diameter, the third nearly as long as the second, and the fourth a little longer than the third, compressed. Eyes holoptic, mouth-parts slightly produced. Thorax yellowish. Abdomen yellowish orange. Wings faintly clouded near the middle and with small spots apically. Halteres whitish transparent. Legs mostly pale straw, the claws moderately stout, rather strongly curved near the distal third, the pulvilli as long as the simple claws. Ovipositor short, the lobes short, broadly rounded and thickly setose. A lateral plate has a broadly rounded sparsely setose ventral lobe and a narrower, obliquely truncate dorsal lobe, the latter separated by a deep and irregularly rounded emargination.

Type Cecid. a2587.

Dyodiplosis generosi new species.

These midges were received from Prof. A. Rutherford, Royal Botanic Gardens, Peradeniya, Ceylon, accompanied by the statement that they were reared July 11, 1914, from twigs infested with *Howardia biclavis* and a species of *Aulacaspis* near *pentagona*, the latter being the more abundant. The reference of this well marked species to the above named genus is provisional, and with the discovery of the male it may prove necessary to erect another genus.

Female.—Length 1.5 mm. Antennæ probably nearly as long as the body, sparsely haired, yellowish brown; probably fourteen segments, third and fourth

fused, the latter with a stem one-third the length of the subcylindric basal enlargement, which latter is slightly constricted near the middle and bears two whorls of unusually high circumfili. These latter form distinct, though irregular loops and in the case of the distal filum, the loops extend almost to the tip of the segment. Palpi: the first segment irregularly quadrate, the second with a length a little over twice its diameter, the third one-half longer than the second, more slender. Mesonotum dark reddish brown. Scutellum and postscutellum white, the abdomen yellowish orange, the segments narrowly margined posteriorly with rather indistinct fuscous bands. Halteres whitish transparent. Legs pale straw; claws stout, strongly curved, simple, the pulvilli rudimentary. Ovipositor short, the terminal lobes narrowly oval and thickly setose.

Type Cecid. a2594.

SOME NEW PHORIDÆ FROM JAVA.[1]

BY CHARLES T. BRUES,

FOREST HILLS, MASS.

Some time ago I received through the courtesy of Professor J. C. H. de Meijere a collection of Javanese Phoridæ belonging to the Amsterdam Museum. These were collected mainly by Mr. E. Jacobson who has made some interesting observations on certain members of this family in Java.

A number of new species are included in the lot which are described in the present paper.

Dohrniphora egregia Brues.

Ann. Mus. Nat. Hungarici, vol. 9, p. 534 (1911).

Of this species originally described from Formosa, there is a single specimen from Nongkodjadjar, Java, January (Jacobson).

Hypocera flavidula new species.

Male.—Length 2 m. Light yellowish brown; front piceous; abdominal segments three to six black, the sides of the first and second darkened; wings distinctly infuscated, especially near the anterior border. Front small, scarcely wider than the eye when seen from above, nearly quadrate; bristles not very strong; post-antennal pair close together, at the extreme anterior margin of the front; next row above of four bristles forming a line that is strongly

[1] Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 99.

bowed downwards medially, the median bristles twice as far from each other as from the lateral ones which are well removed from the eye margin; bristles of next row just above the corresponding ones of the row below, but the row is not so strongly bowed downwards medially; ocelli on an elevated black area which is semicircularly raised above the upper margin of the front. Antennæ orange-colored, moderately large; almost spherical, but somewhat pointed at tip; arista very weakly pubescent, a little longer than the head-height. Palpi scarcely paler than the antennæ, stout, but not enlarged; bristly only at the apex, the bristles not strong. Postocular cilia large, except near the vertex; cheeks each with two long bristles, one of which is much stouter than the other. Mesonotum broad, strongly bristly along its lateral margin; one pair of dorsocentral macrochætæ placed nearer the hind angles than usual. Scutellum very short, nearly four times as broad as long, with four large bristles set very far from the median line. Propleura with three small bristles just above the insertion of the anterior coxa; mesopleura clothed with sparse black hairs anteriorly and above. Abdomen subshining; sixth segment elongated; hypopygium more or less globose, shining yellow, clothed below with sparse bristly black hairs as is also the sixth segment behind; hypopygial lamellæ finely bristly, apical bristles not enlarged. Legs slender, none of the femora thickened; anterior tibiæ with a short bristle externally at the basal fourth, another at the basal third, and another at the middle followed by four or five which become extremely minute before the apex, no spurs; middle tibiæ with a small bristle behind the outer edge near the base, another in front of the edge at the basal fourth, another in front at the middle, a series of three minute ones on the edge near the apex, and three series of minute comb-like bristles in front of the edge near apex, one long spur; posterior tibiæ with a series of six or seven small bristles outside the hind edge and two short spurs. Wings long and narrow; costal vein extending barely beyond the middle, with extremely minute, closely placed, hair-like bristles; first vein ending four times as far from the humeral cross-vein as from the tip of the third; fourth very near the costal margin of the wing, nearly straight except near apex, and recurved at both base and apex, fifth faintly sinuate; sixth more distinctly so; seventh not very distinct. Halteres concolorous with the thorax.

Three specimens from Samarang, March and November, and Batavia, Java, December (Jacobson).

A very distinct species by its color and wing venation. The color of the abdomen varies somewhat, the segments may be quite distinctly margined with pale yellow and the black on the basal segments sometimes extends inwards for a considerable distance.

APHIOCHÆTA Brues.

There are four undescribed species which may be separated by the aid of the following key:

1. Bristles of hind tibiæ in a single series, inside the hind edge 2
   Bristles of hind tibiæ in two series, a stronger one inside the hind edge and a weaker one just outside the hind edge; fore metatarsi of male enlarged, as thick as their tibiæ ..... *A. fortiuscula* n. sp.
2. Mesopleura bare 3
   Mesopleura with a number of small bristles above, near the root of the wing ..... *A. canaliculata* n. sp.
3. Body black, first costal division much longer than the second.. *A. atrita* n. sp.
   Head, thorax and legs yellow; first costal division as long as the second *A. meijerei* n. sp.

Aphiochæta fortiuscula new species. Pl. XIII, fig. 1.

Male.—Length 2–2.5 mm. Thorax brownish-yellow; legs testaceous, with the hind femora infuscated at apex; head black; antennæ dull ferruginous; palpi testaceous; abdomen black, first segment yellow; with narrow, clearly defined yellowish apical bands on all the other segments, each segment medially with a yellowish brown spot near the anterior margin; wings tinged with brownish, the veins fuscous. Front one third higher than broad, brownish along its lower margin; with ocellar tubercle and median frontal line, its bristles large and strong; surface subopaque, pollinose; four post-antennal bristles, the median ones nearly as large as the outer ones and two-thirds as far apart; outer ones slightly nearer to the median line than to the eye-margin and placed higher up than the inner pair of the next row above which are well below the outer bristles of this row; bristles of middle frontal row equidistant, forming a line that curves downward medially. Eyes strongly pubescent. Antennæ small, arista pubescent, twice as long as the front. Palpi of moderate size, strongly bristled below. Postocular cilia enlarged near the upper third of the eye; cheeks below each with a strong bristle and a series of gradually smaller bristles extending to the base of the antenna. Mesonotum elongate, quite shining, with five bristles along the lateral margin; one pair of dorsocentral bristles. Scutellum twice as broad as long, with two strong marginal bristles, the outer pair represented only by hairs. Propleura sparsely hairy, with two bristles at the base of the coxæ and several at the humeri; mesopleura finely bristly above, and with two large, backwardly directed bristles. None of the abdominal segments elongated; each segment with a marginal line of short bristly hairs which also extend forward on the sides of the second and third segments; sixth covered with similar hairs. Genitalia visible only as a pale yellow lamella which bears two bristly hairs at tip. Legs rather stout and short. Fore tibiæ with a singe series of about 12 distinct setulæ nearly half as long as the width of the tibia; middle tibiæ with setulæ in a double row of about eight each, nearly as long as the width of the tibia, and one long spur; hind tibiæ with a row of ten long setulæ inside the hind margin and a row of eleven smaller ones on the basal two thirds outside

the hind margin; with one long and several short spurs. Fore metatarsi three-fourths as long as the tibia and almost as thick near the base, one fourth as thick as long; second tarsal joint twice as long as broad and nearly as long as the metatarsus; following joints also distinctly thickened, wings long and slender, especially toward apex; costal vein extending to the middle of the wing, its bristles short and closely placed; first costal division one half longer than the second; third one-third as long as the second, the furcation of the third vein acute; fourth vein curved near base, and straight beyond; fifth and sixth sinuate, nearly straight; seventh distinct, nearly straight. Halteres dull, light yellow, infuscated on the apex of the knob.

Two males, Depok, Java, October, 1909, and Samarang, Java, June, 1909 (Jacobson).

This species could not be confused with any others having the fore metatarsi enlarged as it has the hind tibiæ biseriate and neither the antennæ nor palpi are enlarged.

Aphiochæta canaliculata new species. Pl. XIII, fig. 6.

Male.—Length 2 mm. Piceous black, incisures of the legs, front tibiæ and tarsi, and middle tibiæ at apex, light yellow; tip of hind tibiæ and the middle and hind tarsi deeper yellow; palpi dull yellow; hypopygial lamella yellow. Wings tinged with brownish, veins piceous. Front slightly broader than high, its surface slightly pollinose but shining. Frontal bristles very long and well developed; ocellar tubercle and median frontal groove present; four post-antennal bristles of nearly uniform size, the lower ones two-thirds as far from the median line as the upper; inner bristle of next row on a level with the lower post-antennal bristle, outer one level with the upper post-an-antennal; four equidistant bristles in next row, forming a line curving downward medially. Postocular cilia large and stout; cheeks with two or three stout bristles followed by a series of smaller ones extending to the base of the antennæ. Antennæ slightly enlarged, the arista distinctly pubescent, slightly over twice as long as the height of the front. Palpi stout, slightly swollen, with very strong bristles near the apex. Mesonotum shining, its lateral bristles weak, about five in number; no dorsocentral bristles although there is a strong bristle at each posterior angle and a row of six bristly hairs near the base of the scutellum. Scutellum almost semicircular, with two long marginal bristles. Propleura shining, bare, except for five or six rather strong upwardly directed bristles near the spiracle and three strong downwardly directed ones just above the insertion of the coxa; mesopeura above with a patch of about eight coarse, bristly hairs. Abdomen with the second and sixth segments very slightly elongated; upper surface sparsely clothed with short, stiff hairs, more abundant at the sides. Hypopygium small, not inflexed, the lamella broad. Legs moderately long and slender, densely hairy; front tibiæ with long hairs externally, but no setulæ, their tarsi slender; middle tibiæ with about six fine setulæ inside the hind edge and an equal number of smaller ones on the basal half outside the edge, one long spur; hind tibiæ with a single row of about a

dozen medium-sized setulæ inside the hind edge from which they are separated by a more distinct groove than usual, one long and one short spur. Hind femora with a few curved bristly hairs below at the base. Wings rather long and narrow, the costa reaching barely beyond the middle of the wing, its bristles rather long, slender and closely placed; first division equal to or scarcely exceeding the second; third one-third as long as the second, the furcation of the third vein acute; fourth vein curved only at the base; fifth vein nearly straight, sixth slightly sinuate, seventh distinct. Halteres piceous, yellowish at the base of the knob.

One male from Goenceng Gedeh, Java, March, 1911 (Jacobson). This is related to the British *A. beckeri* Wood, from which it differs by the small hypopygium, shorter costal bristles and higher front.

Aphiochæta atrita new species.

Male.—Length 2 mm. Black; legs piceous, the front pair fuscous; wings hyaline, veins dark fuscous; palpi pale yellow. Front about as high as broad, its bristles strong; ocellar tubercle and median frontal groove present; four post-antennal bristles, the lower ones half the size of the upper and two-thirds as far apart; inner bristles of next row barely above the upper post-antennals and midway between them and the eye-margin; outer bristles of this row close to the eye-margin and considerably above the inner ones; row above strongly curved downward medially. Antennæ rather large; arista pubescent, one-half longer than the height of the front. Palpi of moderate size, strongly bristly below. Cheeks each with two large, stout bristles directed downwards and a series of much smaller ones extending toward the base of the antennæ. Mesonotum strongly convex, subshining, its lateral bristles short, except for one very long one a short distance in front of the hind angle; one pair of distinct dorsocentral bristles. Scutellum twice as broad as long, not strongly curved behind, with one pair of strong bristles and a weak hair anterior to each of these. Propleura bare except for three downwardly directed bristles at the lower margin and one upwardly directed one just below the spiracle. Mesopleura bare, shining below and slightly roughened above. Abdomen bare except for a few bristles on the last two segments and a very few short ones evenly distributed along the sides; none of the segments elongated. Hypopygium very small, sparsely clothed with fine hairs; lamella dark, paler at tip. Legs long, but rather stout; front tibiæ without setulæ, their tarsi slender; middle tibiæ with no distinct setulæ and one long spur; hind tibiæ with a few weak and rather short setulæ inside the hind margin on the apical two thirds, with one moderate and one short spur; hind femora with a few weak curved bristly hairs below near the base. Wings moderately long and narrow; costa just attaining the middle of the wing, its bristles of medium length and sparsely placed apically although closer together near the base; first section of costa barely longer than the second and third together; second twice as long as the third; fourth vein weakly curved at the base, almost straight beyond; fifth

and sixth very faintly sinuate; seventh faint, straight, parallel with the sixth and well removed from the anal angle of the wing. Halteres entirely black.

One specimen from Goenceng Gedeh, Java, March 11 (Jacobson).

The hypopygium is so small and the lamella so broadly attached at the base that I was at first in doubt as to the sex of the type. The two upcurved bristles at the apex of the appendage and the absence of an ovipositor of any type hitherto described, make it evident that the individual is a male.

Aphiochæta meijerei new species. Pl. XIII, fig. 7.

Male.—Length 2.5 mm. Pale yellow; ocellar tubercle, knob of halteres, an oblique spot at each side of the first abdominal segment; third, fourth and fifth abdominal segments, except a median band which extends laterally along the sutures, seventh segment, and apex of hind femora black. Wings tinged with yellow, especially in front; veins brownish yellow. Front as broad as high, with ocellar tubercle and median frontal groove; four post-antennal bristles, the upper ones one-third longer than the lower ones and nearly twice as far apart; bristles of next row extremely close together near the eye-margin, both below the upper post-antennals; next row of four equidistant bristles forming a row curved downwards medially. Antennæ small; arista pubescent, nearly twice as long as the height of the front. Palpi of moderate size, with very strong bristles toward the tip. Mesonotum subshining, with six bristles along the lateral margin; one pair of dorsocentral bristles. Scutellum nearly semicircular, with one pair of bristles and a weak hair anterior to each of these. Propleura with two downwardly directed bristles below and a patch of hairs forming a double row below the spiracle and extending half way down the pleura; mesopleura entirely bare. Abdomen with the second segment slightly elongated, furnished with a patch of bristles on each side which is repeated on the three following segments. Legs slender; anterior tibiæ without setulæ, their tarsi not enlarged; middle tibiæ with about eight small setulæ inside the hind edge and as many minute ones outside the edge; with one long spur; hind femora slightly ciliated below at base; their tibiæ with ten or a dozen rather small setulæ in a single series. Wings narrow; costal vein slightly exceeding the middle of the wing, its bristles extremely minute and closely placed; first division of costa not quite as long as the second which is five times the length of the third; light veins all very weakly curved, the fourth almost straight except near base and apex. Halteres with piceous knob and yellowish brown pedicel.

One female from Wonosobo, Java, April, 1909 (Jacobson). I have also some specimens from Formosa.

A species very similar to the widespread *A. flava*, but with fewer and larger setulæ on the middle hind tibæ, larger lower post-antennal bristles, and dark halteres.

Aphiochæta gregalis de Meijere. Pl. XIII, fig. 5.

Ann. Jard. Bot. Buitenzorg, 2nd Ser., Suppl. III, p. 931 (1910).

From a specimen of this species determined by de Meijere, I am able to add the following characters to the original description:

The median pair of lowest reclinate frontal bristles equidistant from the median line and the eye-margin and inserted scarcely above the two proclinate ones; the lateral ones of this row small, inserted near the eye margin and a considerable distance above the median ones. Propleura with a number of bristles, longer at the insertion of the coxa; mesopleura above with numerous very fine, delicate bristles, but no large ones. None of the abdominal segments elongated, second with a few bristles at each side; sixth apically and the seventh with a number of fine black bristles. Legs very long (fig. 5).

Phalacrotophora jacobsoni new species.

Male.—Length 3.5 mm. Black; legs beyond the femora brownish-yellow, femora piceous except at base and apex; antennæ orange-yellow, palpi pale yellow; scutellum brown along posterior margin; hypopygial lamella pale yellow; halteres yellowish white; wings subhyaline, slightly infuscated toward apex. Front twice as high as wide, produced anteriorly into a rounded lobe; surface shining, impunctate; only two proclinate bristles, placed close together and well-developed, but much shorter than the two reclinate bristles of the next row above which are placed above the lower margin twice as far from the median line as from the eye-margin; next row consisting of only two medium-sized bristles next the eye-margin at the middle of the front; row above of four equidistant medium-sized bristles which form a line that is slightly, but distinctly bowed upward medially; ocellar row of four bristles; ocelli large, in a low triangle. Vertex raised, carinate on its margin for some distance along the outer orbits, but not set off from the front by a distinct groove. Eyes large, strongly pubescent, their inner margins parallel. Antennæ small, with a dorsal, faintly pubescent arista as long as the head-height. Postocular cilia much lengthened just above the middle of the eye, but smaller again above where they follow the eye-margin inside the raised vertex. Mesonotum elongate, almost twice as long as wide, thickly hairy, but shining; with three long bristles along the lateral margin before the wing, one just behind the root of the wing followed by two very long ones before the hind angle; posterior margin with eight slender bristles overlying the scutellum; no distinct dorsocentral bristles. Scutellum twice as broad as long, with two strong marginal bristles near each lateral angle. Abdomen bare and shining above, with short, bristly hairs along the lateral margin; none of the segments noticeably elongated; hypopygial lamella with two upcurved bristles at apex. Pleuræ smooth, without bristles except for two small ones above the

insertion of the anterior coxa and one at the upper anterior angle of the propleura. Legs short and stout; front coxæ hairy beneath and bristly at tip; middle coxæ hairy, bristly along outer margin, but scarcely so at tip; all tibiæ biseriately setose; setæ of front tibiæ in nine pairs; those of middle tibiæ very stout, longer than the width of the tibia, in eight pairs; those of hind tibiæ scarcely longer than those of the middle ones, in eight pairs, front tibiæ with a circle of small blunt spinules at tip; middle ones with one large and three smaller spurs; hind ones with several moderate sized spurs; all femora very stout, those of the four posterior legs flattened, shortly ciliate below, the hind ones one-third as broad as long. Wings long and narrow; costal vein extending to the middle, with short, fine, closely placed bristles, first vein ending a little further from the humeral cross-vein than from the tip of costa; tip of second vein close to the tip of third, the cell at the furcation small and narrow; fourth vein slightly curved at base, recurved apically; fifth evenly arcuate, except for a slight recurving at base; sixth and seventh nearly straight. Halteres yellowish white.

Female.—Length 4 mm. Fifth abdominal segment with a brownish yellow band at apex; sixth segment piceous, brown laterally in front. Abdomen with the sixth segment elongated.

Described from a male and female taken at Batavia, Java, in August, 1907 (Jacobson).

This species is closely related to *Aphiochæta braunsi* Brues[1] from Cape Colony which also is properly referable to *Phalacrotophora* on account of the extremely long front. It differs from the South African species by the form of the upper row of frontal bristles, lack of distinct dorsocentral bristles, shorter scutellum; short first wing vein and recurved fourth vein. In color and other characters the two species are very similar.

Plastophora javensis new species. Pl. XIII, figs. 2 and 3.

Male.—Length 1 mm. Thorax dull fuscous, head and abdomen piceous; legs dull yellowish, the hind femora darker; and the fore coxæ whitish hyaline, with fuscous thick veins and almost hyaline light veins. Front somewhat more than one-half higher than wide; two very small, proclinate post-antennal bristles; bristles of lowest reclinate row well-developed, the median ones nearer to the median line than to the eye-margin, far below the lateral ones which are quite close to the eye-margin; middle reclinate row equidistant, curving upwards medially; ocellar row large; ocelli on a very indistinctly defined elevation; median frontal line present. Antennæ of moderate size, with apical, bare, arista on the oval third joint; antennal cavities very shallow. Palpi and proboscis injured in the type so that they cannot be described. Postocular cilia large, but not closely placed; two larger bristles on each

[1] Entom. News, Vol. 18, p. 391 (1907).

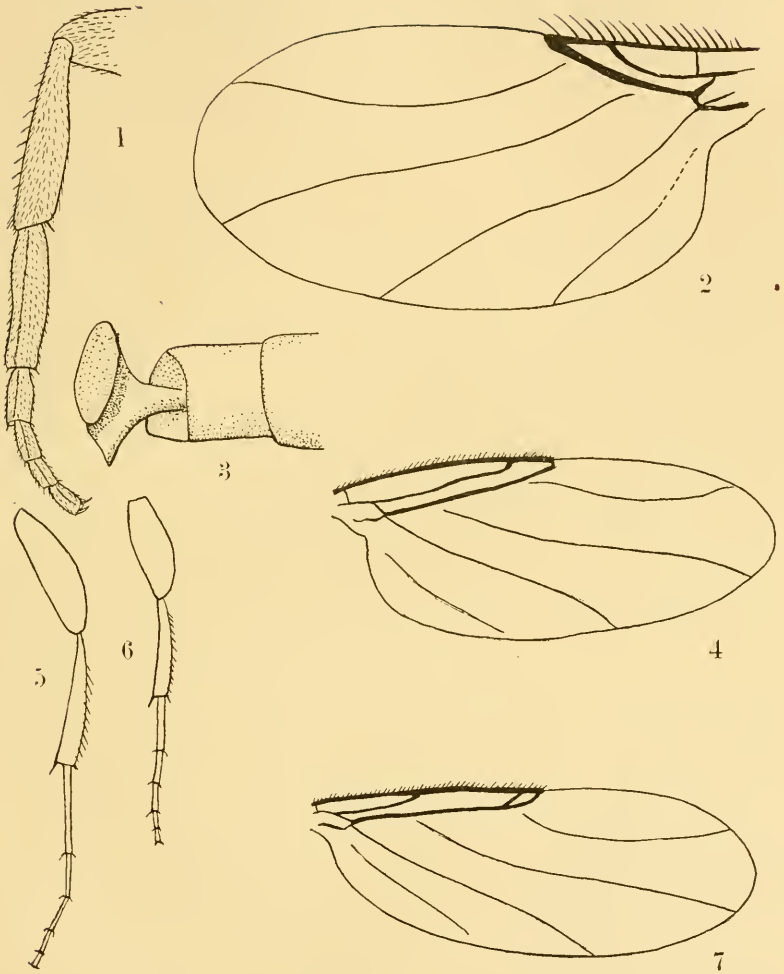
cheek; eyes distinctly pubescent. Mesonotum subshining, clothed with coarser hairs than usual; along each side with three long bristles before the root of the wing and another behind at the lateral angle; one pair of conspicuous dorsocentral bristles, but no bristles along the posterior margin. Scutellum suddenly shortened laterally, with one pair of marginal bristles, although a second lateral pair is indicated by fine hairs. Abdomen opaque; without hairs or bristles; second and sixth segments slightly elongated. Ovipositor chitinized, enlarged apically from a narrowed base and truncate so that the apex is in the form of an oval, margined disk (fig. 3) below which is a downwardly projecting tooth or short blade. Legs long and very slender; fore and middle coxæ with a few bristles at tips. Tibiæ hairy, but without any distinct setulæ; middle ones with a slender, moderately long spur, hind ones with only a very weak and indistinct spur. Propleura with several small bristles at the base of the fore coxa, mesopleura apparently bare. Wings broadly oval; costal vein falling distinctly short of the middle of the wing, with about 14 long, sparsely placed bristles; third vein thickened, not forked; first vein ending close to the third, its tip twice as far from the humeral cross-vein as from the tip of the third; fourth vein evenly curved; fifth and sixth sinuate; seventh nearly straight. Halteres whitish yellow.

One specimen from Samarang, Java, October, 1909 (E. Jacobson). The label bears the additional information "myrmecophilous."

This species is at once distinct by the peculiar configuration of the ovipositor. The very short costal vein is similar to that of the North American species, *P. crawfordi* Coq. and *P. currei* Malloch from both of which the Javanese form differs by its narrower front and the arrangement of the frontal bristles.

EXPLANATION OF PLATE XIII.

Fig. 1. Fore tarsus of *Aphiochæta fortiuscula* n. sp.
Fig. 2. Wing of *Plastophora javensis* n. sp.
Fig. 3. Ovipositor of *Plastophora javensis* n. sp., lat. view.
Fig. 4. Wing of *Hypocera flavidula* n. sp.
Fig. 5. Hind leg of *Aphiochæta gregalis* de Meijere.
Fig. 6. Hind leg of *Aphiochæta canaliculata*.
Fig. 7. Wing of *Aphiochæta meijerei* n. sp.



Phoridæ.

THE IMMATURE STAGES OF PLAGIOGNATHUS POLITUS UHLER AND CAMPYLOMMA VERBASCI HERRICK-SCHAEFFER (CAPSIDÆ, HEMIPTERA).

By M. D. LEONARD,

ITHACA, N Y.

Plagiognathus politus Uhler.

This little black capsid spends the winter in the egg-stage in one-year-old apple twigs. The eggs are inserted nearly their full length into the tissue of the stem at the base of the leaf-buds and lie nearly parallel to the axis of the twig. Sometimes they are inserted directly into the bud scales. Ordinarily the eggs are laid singly but often two or three may be found projecting from the base of a single bud.

Plagiognathus politus has been reared in large numbers during the past few seasons from apple twigs collected at Ithaca, N. Y. These were brought into the insectary in February or March and the pale yellow nymphs first appeared about the time the blossoms were beginning to show pink.

The following descriptions of the stages are from rearings made during the past two seasons at Ithaca, N. Y. They are taken from the living specimens.

The Egg (Pl. XIV, fig. 7).—Length, .9–.95 mm.; width, .2 mm.; cylindrical, slightly compressed and curved; somewhat constricted near anterior end which is squarely truncate; cap narrowly elliptical in outline; color shining pale yellowish or whitish.

Stage I (Pl. XIV, fig. 8).—Length, .8 mm. General color, pale yellowish; eyes reddish; antennæ in some specimens slightly tinged with dusky; tip of beak dusky; tip of tarsi slightly tinged with dusky; position of abdominal gland faintly indicated by greenish.

Stage II (Pl. XIV, fig. 9).—Length, about 1.12 mm., greatest width of abdomen about .5 mm. General color pale yellowish, abdomen often tinged with greenish. Antennæ, except tip of segments, tinged with dusky; second segment sometimes has indication of brownish ring at middle; indication of a dusky stripe on dorsal edge of hind femora; tibiæ more slender than in preceding stage, faint dusky band near base of tibiæ, especially of posterior pair; tip of tarsi distinctly

darkened. Edge of dorsal abdominal gland narrowly bordered with dusky. Hairs on body darker than in preceding stage. Prothorax slightly emarginate behind.

Stage III (Pl. XIV, fig. 10).—Length, 1.5 mm. General color pale yellowish green. Whole body with sprinkling of fine hairs which in some lights are golden, in others darker. Eyes dark reddish; head yellowish; thorax often with indistinct greenish markings. Abdominal gland edged narrowly with dusky. Mesothoracic wing-pads just beginning to become apparent. Antennæ, except first segment, pale grayish, each segment lighter at tip and darker at base. Legs yellowish; femora with a blackish stripe on dorsal edge and a short stripe on ventral edge; tibiæ with a blackish band at base. Extreme tip dusky; tarsi dusky at base and tip paler in middle.

Stage IV (Pl. XIV, fig. 11).—Length, 1.85 mm. General color more greenish than in preceding stage. Body more thickly clothed with hair than in preceding stage. Eyes dark reddish; head yellowish; prothorax often with two large more or less distinct yellowish spots, mesothorax often yellowish on lateral margins; wing-pads extend back onto second abdominal segment. Abdomen green; tip often yellowish; abdominal gland narrowly edged with dusky. Antennæ light brownish, base of each segment dusky, and tip, except in terminal segment, whitish; first segment dusky or blackish at the middle; second segment relatively longer than in preceding stage; legs yellowish; stripe on ventral edge longer than in preceding stage; tibiæ blackish at base, sometimes dusky at tip, with two rows of blackish spots from each of which arises a blackish hair; tarsi as in preceding stage.

Stage V (Pl. XIV, fig. 13).—Length, 2.2 mm. General color greenish, often a yellowish green. Markings variable but in general as follows: Head tinged with yellow; eyes dark reddish; the yellowish spots on prothorax more or less distinct, sometimes lacking, often darker green irregular markings on mesothorax and wing-pads, lateral margins often yellowish. Wing-pads reach back onto fourth abdominal segment. At the end of the instar the wing-pads become blackish at the tip and tinged more or less with dusky throughout. Antennæ brownish yellow; first segment with two narrow blackish stripes reaching nearly to the tip, remaining segments dusky at base and, excepting the fourth, whitish at extreme tip. The relative length

of the segments about as in the preceding stage; antennæ and legs more slender. Legs as in stage IV but markings, as a rule, darker.

Adult (Pl. XIV, fig. 14).—Length, about 4 mm. Color dark brown to black, somewhat shining. Eyes dark reddish. Antennæ blackish. Coxæ, trochanters and femora black, except tip of latter which is yellow; remainder of legs as in fifth stage nymph. The two cells at the base of the membrane are outlined with whitish. Whole body, legs and antennæ covered with fine golden hairs.

Campylomma verbasci Herrick-Schaeffer.

This species is found throughout the summer at Rochester Junction, N. Y., breeding abundantly on the common mullein, *Verbascum thapsus* L., and on apple nursery stock. The following technical descriptions of the immature stages are based on rearings made by the writer during the summer of 1914.

The Egg (Pl. XIV, fig. 1).—Length .75 mm., width .15 mm.; cylindrical, rather strongly curved; posterior end bluntly rounded; constricted just before anterior end which is obliquely truncate; cap very narrowly elliptical in outline; color whitish or pale yellowish, semi-shining.

Stage I (Pl. XIV, fig. 2).—Length .6 mm., greatest width of abdomen .12 mm. Color, very pale translucent yellowish. Eyes reddish. Body sparsely covered with rather long hairs which are dark in some lights, golden in others. Legs and antennæ translucent whitish. Beneath as above; tip of beak dusky.

Stage II (Pl. XIV, fig. 3).—Length, .85 mm., greatest width across abdomen, .36 mm. General color pale yellowish, legs and antennæ usually pale translucent. Otherwise as in preceding stage except that body is proportionately a little stouter and relative size of thoracic segments is different as can be seen by comparing the figures.

Stage III (Pl. XIV, fig. 4).—Length, 1.24 mm., greatest width (across thorax) .5 mm. General color pale yellowish, thorax often tinged in irregular spots with pale greenish; abdomen pale greenish. Wing-pads just beginning to show on mesothorax. Antennæ and legs pale yellowish, extreme tip of tarsi slightly dusky. A round, blackish, setigerous spot above, and a fainter one below, near tip of hind femora. A faint setigerous spot on fore and middle tibiæ near tip, above. Middle and hind tibiæ each with two blackish setigerous

spots near base. Tip of beak dusky. Body somewhat more thickly clothed with hairs than in preceding stage.

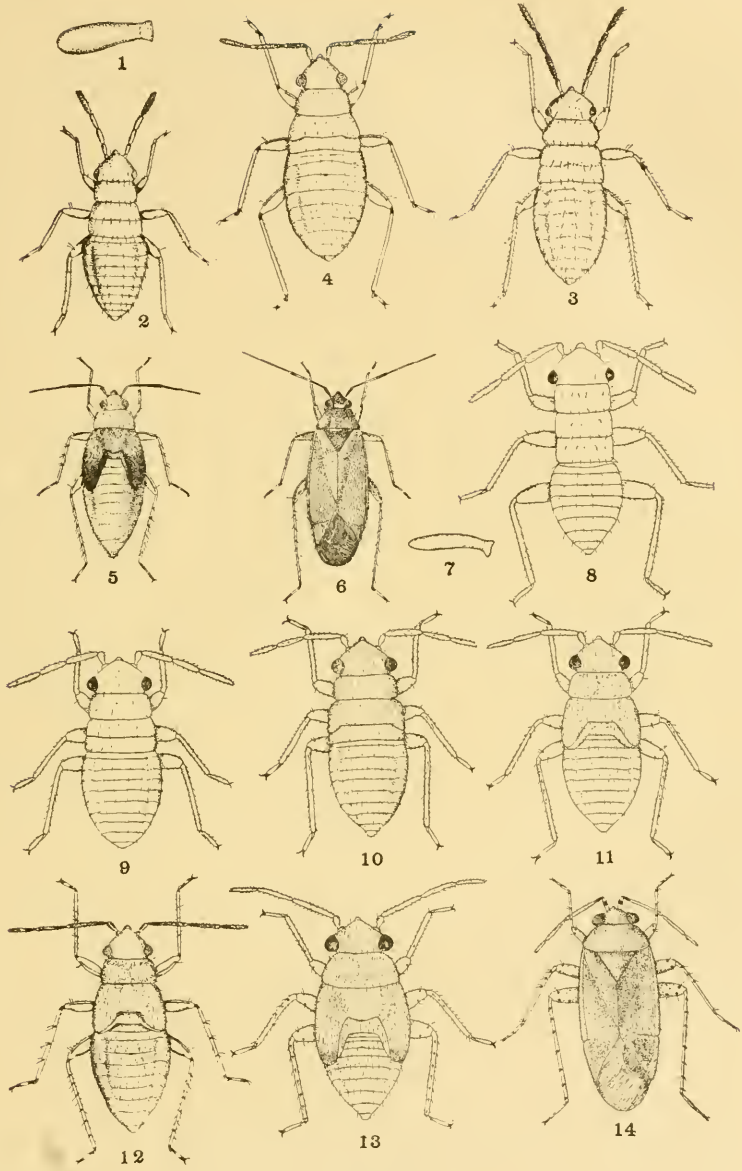
Stage IV (Pl. XIV, fig. 12).—Length, 1.5 mm.; greatest width (across wing-pads), .62 mm. Head and thorax pale yellowish; prothorax often with two large greenish circles; remainder of thorax and wing-pads usually tinged with irregular greenish markings, abdomen pale green, tip yellowish. Wing-pads extend back to third abdominal segment. Eyes reddish. Antennæ and legs pale yellowish. Spots on femora as in preceding stage. Middle tibiæ with two or three, and hind tibiæ with five or six round blackish spots from each of which arise two blackish hairs. Tip of tarsi dusky. Whole dorsum rather thickly clothed with hairs which in some lights are golden, in others dark. Beneath pale yellowish except venter which is pale green. Tip of beak dusky.

Stage V (Pl. XIV, fig. 5).—Length, 1.9 mm.; greatest width (across wing-pads), .95 mm. General color pale greenish, abdomen a somewhat darker shade than rest of body. Darker greenish marking on thorax and wing-pads as indicated in the figure; extreme tip of wing-pads often dusky. Eyes dark red. Legs and antennæ pale yellowish. There are seven, four, and two setigerous spots on the hind, middle and fore tibiæ respectively. Tip of beak and extreme tip of tarsi dusky. Body, as in preceding stage, thickly clothed with fine hairs.

Adult (Pl. XIV, fig. 7).—Length, 2.65 mm. General color greenish gray or dirty grayish white; head and prothorax more inclined to brownish-yellow, the former often reddish-brown. Cuneus usually with a large brownish spot. Legs and antennæ yellowish, slightly tinged with brownish; a black ring on middle of first segment and at base of segment of antennæ. Legs marked as in fifth stage nymph except that posterior femora are marked with many small black spots. Beneath black or dark brown. Beak yellowish, tip dark brown.

EXPLANATION OF PLATE XIV.

C. verbasci.		*P. politus.*	
Fig. 1.	Egg.	Fig. 7.	Egg.
Fig. 2.	Stage one.	Fig. 8.	Stage one.
Fig. 3.	Stage two.	Fig. 9.	Stage two.
Fig. 4.	Stage three.	Fig. 10.	Stage three.
Fig. 12.	Stage four.	Fig. 11.	Stage four.
Fig. 5.	Stage five.	Fig. 13.	Stage five.
Fig. 6.	Adult.	Fig. 14.	Adult.



Capsidæ.

MISCELLANEOUS NOTES.

Stenomimus pallidus Boh.—May eleventh, 1893, while collecting beetles in the prehistoric cemetery near Madisonville, Hamilton Co., Ohio, I examined the trunk of a fallen black walnut tree (*Juglans nigra*). I pulled off the bark and in the moist fibers beneath there were thousands of this species. I had never taken it before and when I came home and studied it, I recognized it by the description given by Horn in Proc. Amer. Phil. Soc., p. 441. Returning to the locality three days later for more specimens, I found the bark dried up and not a specimen to be obtained. Nor have I met with it since. This was evidently its breeding place and minute pale grubs were observed with the beetles, the larvæ.—Charles Dury.

Local Species of Dermestes.—While nothing can be added to the synopsis printed in this JOURNAL (VIII, pp. 140–143; 1900), an isolated statement of the differences that characterize our four local species may be useful to some readers. *D. lardarius* has the front part of the elytra uniformly and closely clothed with pale reddish hairs, except for three denuded spots. *D. caninus* is decidedly marmarate with pale hairs, mingled with some reddish ones on the thorax. It is black, comparatively broad and the male has tufts of brown hair on two ventral segments. *D. vulpinus* is dark brown or piceous in color, sparsely clothed with gray hairs, which are noticeably condensed at the sides of the thorax. It is more elongate, the sutural angle of the elytra is prolonged into a distinct tooth, and the male has the tuft of brown hair on one ventral segment only. *D. frischii* is black, clothed with gray hair, condensed, as in *vulpinus,* at sides of thorax, but with a dark spot near base within the pubescent part. It is as broad as *caninus* but like *vulpinus* has only one ventral segment with the tuft of brown hair. The color characters may be obscured in poorly preserved specimens, but the male tufts of hair and the difference in form will still serve to separate these species.—C. W. Leng.

Tychius (Microtogus) picirostris Fab.—In European specimens of *T. picirostris* in the Nat. Museum collection, shown me by Mr. E. A. Schwarz, I recognized the species described by me as *T. griseus* from Ithaca, N. Y.—Charles Schaeffer.

PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING OF APRIL 20, 1915.

A regular meeting of the New York Entomological Society was held April 20, 1915, at 8:15 P.M., in the American Museum of Natural History, President Dr. Raymond C. Osburn in the chair, with 18 members and two visitors present.

Mr. Dow for the Field Committee reported on the outing of April 11 at Central Park, L. I., mentioning especially the capture of *Tricrania sanguinipennis*. The proposed outing of May 31st at Coytesville was discussed and action postponed to the next meeting.

Mr. Davis exhibited and spoke of the "Orthoptera collected in Florida by Messrs. Mutchler and Watson," pointing out the characters of the two new species obtained, illustrated by figures drawn, in spite of illness, by Mr. Joutel, and the minor differences that characterized several other species in the Floridian part of their range.

Mr. Davis also exhibited and spoke of certain species of *Cicada* and their synonymy, pointing out the importance in classification of the anal plates and the tendency to always look at the wrong end of an insect exhibited in some of the descriptions.

His remarks will be printed in full in the JOURNAL.

The discussion that followed in which Dr. Osburn and Mr. Engelhardt took part brought out some of the differences between northern and southern Florida in the distribution of Orthoptera and the occurrence at Everglade of *Aplopus mayeri* Caudell, a species previously known from Tortugas only.

Mr. Woodruff under the title "New Homoptera in Local Fauna" exhibited and described a new species of Membracidæ and the previously unknown male of another species, taken at Bronxville, dwelling particularly on the peculiar environment for each.

Dr. Osborn, Mr. Davis and Mr. Olsen, in discussing the paper, spoke of the real or apparent scarcity of males in certain groups of insects and the causes thereof.

Mr. Harris spoke of his recent trip southward, covering Fortress Monroe, Southern Pines, Columbia and Summerville, saying that though the season was everywhere backward and Cicindelidæ scarce, he had succeeded in taking *C. vulgaris minor* and *C. rugifrons carolina* and thus extending their known range.

Mr. Harris also commented on the fact communicated by Mr. Lantz that at Washington, D. C., *C. sexguttata* is taken in the fall as well as in the early part of the year up to July, while on the Palisades he had never found it in the fall, though it has been taken at that season elsewhere in the vicinity of New York City and some specimens evidently live through the winter, after pupation in autumn, being found very early in the year under bark or stones.

Mr. Sherman spoke of a recent visit with Mr. Schwarz at his home on

17th St. in Washington, and his strong interest in current entomological events, recounting many of his comments. The number of melanic forms of Coccinellidæ from the northern boundary at Alaska, the changes in the fauna of Phœnix, Ariz., due to irrigation, and of the Florida Keys, due to commercial improvements, the difficulty of collecting at Lake Superior except on the beach, the damage to entomological collections from unfavorable environments, the praisworthy tendency of modern writers to define genera more accurately, and the lamentable tendency of some to exalt type specimens at the expense of minuteness in description, were some of the topics discussed. The resemblance between *Dromius atriceps,* of which the type came from Bayou Sara, Louisiana, and additional specimens from Virginia Beach, and *Demetrius atricapillus,* as noted by Leconte (Trans. Am. Ent. Soc., VIII, 1880, p. 164) was particularly mentioned; and the admirable work of Adam Boving and others, especially Hyslop and Keakirt in tracing the biological history of obscure species received the highest praise. Mr. Sherman closed his remarks with some references to the disposal of the Asa Fitch collection and accompanying note books.

MEETING OF MAY 4, 1915.

A regular meeting of the New York Entomological Society was held May 4, 1915, at 8:15 P. M., in the American Museum of Natural History, Vice-President H. G. Barber in the chair, with fourteen members and one visitor present.

The Curator reported the donation to the local collection of *Hylecoetus lugubris* Say, from Mr. R. P. Dow, the specimen having been caught April 18 at Beaver Swamp, near Coytesville, N. J., also thirty-one species from Mr. Leng.

Mr. Leng read from Prof. Bradley's letters the proposed itinerary of the mounted by Mr. Wunder and presented the manuscript of Mrs. Annie Trumbull Slosson's "A Few Memories" for publication in the JOURNAL.

Mr. Schaeffer exhibited *Eupsalis minuta* and the allied forms *lecontei* and trip to the western part of the State in June. Mr. Davis showed photographs *sallei* described by Power, stating that the first seemed northern in distribution, the second southern, while both were very close to the typical form. His remarks will be printed in the JOURNAL.

Mr. Engelhardt, under the title "Noctuidæ collected on Willow Bloom" spoke of the various methods he had employed in early spring collecting, the numbers in which some species had unexpectedly been obtained and particularly of some of the rarities included in the catch. He said that the electric lights, especially in country districts were productive; the running sap of tapped sugar maples, also birches and slippery elms, was also very attractive, clouds of moths rising on occasions from the natural bait offered by the sap; the beating of branches, to which last year's leaves still clung, into the umbrella was a third method which was more satisfactory in the rare species it yielded than in the number of specimens; but best of all he considered the visitation at night with a lantern of the Willow Bloom, or in its absence of other early

flowering shrubs, like the spice-bush. During the present spring such collecting had been practiced with marked success at Chickadee Farm, N. Y., four miles from Kent, Conn., and at Massapequa, L. I., with Mr. Doll, and on the West Hills, near Huntington, L. I., with Mr. Davis. Boxes of specimens from Mr. Engelhardt's and Mr. Davis's collection were exhibited, and the more remarkable species were pointed out. Mr. Engelhardt closed by commenting especially upon the habits of *Homoglœa hircina* and allied species, saying that while most of them seemed to be fall species, *H. hircina* was generally found in the spring.

Mr. Davis exhibited photographs of the Chichester Homestead, formerly known as the Inn of Peace and Plenty, at which he and Mr. Engelhardt boarded during their collecting between the West Hills and the Half Way Hallow Hills, with some of the charactertistic scenes in the neighborhood, including the Cathedral Cedars, the Laurels, higher than a man, and a map of the region, showing its accessibility from either Huntington or Farmingdale, by trolley.

Mr. Davis also showed photograph of Messrs. Dow, Engelhardt and Nicolay, taken in the forest, ruined by fire, where *Tricrania sanguinipennis* was found; and the bound works of two of our members, Mr. Chas. Schaeffer and Dr. W. M. T. Forbes.

Mr. Dow spoke of "Indian Legends about Insects" showing how the conflict between man and animals arose and how the insects aided the latter and refused, and still refuse, to be governed by the truce afterwards arranged. He told also how the spiders figured in these legends; and how closely they appear to be connected with the superstitions of the negroes in Jamaica, relating in detail the story of Anansee and the black spiders into which his victims become changed.

Mr. Davis spoke of a greenish variety of *Cicindela tranquebarica* he had taken in the Half Way Hollow Hills and of a still greener one found by Mr. Schaeffer at Wyandanch; also of *Meloe americana* being found at night while hunting moths by light.

Mr. Schaeffer related his experiences in similar night collecting of beetles, saying that many species of *Listrochelus, Lachnosterna, Phytalus, Diplotaxis, Anomala,* were thus obtained that were never or rarely seen by day. Sweeping just when the sun begins to go down or so-called "evening sweeping" he had also found an invaluable method of obtaining many of the small species he had recorded in Smith's List; the most convenient method being to use several bags so that each could be tied up when filled and examined at leisure later.

Mr. Davis spoke of "evening sweeping" being found on heavily overcast days all day long; but Mr. Schaeffer said that most of the species thus obtained, while numerous, would be diurnal species that had settled down on the vegetation in the absence of sunlight and not the nocturnal species, which would not come out until their usual hour.

THE NEW YORK ENTOMOLOGICAL SOCIETY.

Organized June 29, 1892.—Incorporated June 7, 1893.

The meetings of the Society are held on the first and third Tuesday of each month (except June, July, August and September) at 8 P. M., in the AMERICAN MUSEUM OF NATURAL HISTORY, 77th Street and Eighth Ave.

Annual dues for Active Members, $3.00.

Members of the Society will please remit their annual dues, payable in January, to the treasurer.

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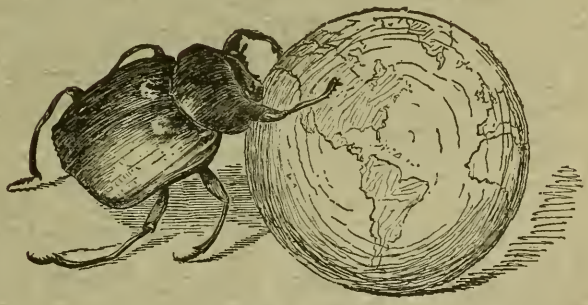

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Vol. XXIII. DECEMBER, 1915. No. 4.

NOTES ON THE IMMATURE STAGES OF SOME NEW YORK TRICHOPTERA.*

By J. T. Lloyd,

Ithaca, N. Y.

The larvæ of the four species of Trichoptera whose immature stages are herein described were captured in waters in the vicinity of Ithaca, New York. The adults which emerged in captivity, except *Neuronia pardalis,* were kindly determined by Mr. Nathan Banks.

Neuronia pardalis Walker.

Larval Habits.—The larvæ were found in two small spring-fed streams in the McLean swamp, about eighteen miles north of Ithaca. These streams are overhung with a dense thicket of alders and their bottoms are littered with fallen leaves, but are almost free from living vegetation.

Few specimens were found and little effort was made to draw conclusions concerning the food and habits of the species. Such observations as were made, however, indicate that the habits are the same as those of the well-known *Neuronia concatenata.* The larva of this species crawls about over the bottom and among submerged vegetation feeding on leaves living and dead. In preparing to pupate it attaches its case tightly in some secluded crevice and spins a silken mesh across each end of the case. Frequently fragments of grass or other bits of vegetable matter are cemented around the forward end of the case.

* Contribution from the Limnological Laboratory of the Department of Entomology in Cornell University.

Abdomen.—In life dark green with a distinct reddish tinge especially on the dorsal side; gills pale reddish; each lateral hump is tipped with a circular spot of small spines, near the center of the spot there is a seta; the dorsal hump ends in a pointed finger-like process; the lateral fringe commences at the middle of the third segment and extends to the caudal margin of the eighth segment, where it ends on a backward projecting lobe, the fringe is weak and composed of very fine hairs; the arrangement of gills is diagrammatically shown in pl. 16, fig. 13, the gills of the median line possess hairs, continuations of the lateral fringe; the ninth segment, as seen from above, projects backward as a prominent lobe which bears a chitinous plate and is armed on its caudal margin with four well-developed setæ and several of smaller size; on the fleshy projection above each drag-hook there are three large and several small setæ; the drag-hooks bear one large and apparently three small hooks on the dorsal side, pl. 15, fig. 2, illustrates a drag-hook with only the largest of its three teeth showing, the others being hidden behind this one.

Pupa.—Description made from a cast skin. The mouthparts are weakly chitinized, the labrum is rectangular with rounded corners, about one and a half times as long as wide; the mandibles are about half the length of the labrum and are almost as broad as long, a projection on the outer side bears two prominent setæ on its tip; the lateral fringe commences on the cephalic margin of the fifth abdominal segment and loops under the caudal margin of the eighth segment; a pair of sucker-like disks occur at the caudal margin of the last abdominal segment above. Each disk has a single seta on its outer margin and a group of three large setæ beneath its cephalic margin; the first abdominal segment has a striate appearance above and is bordered behind by a mark, as in pl. 16, fig. 5; the arrangement of teeth on the dorsal plates is illustrated in pl. 16, fig. 5.

The Case.—Length 30–40 mm.; breadth about 5 mm. In form it is a slightly curved cylinder, tapering a very little toward the rear end. It is built of quadilateral sections of leaves arranged in a series of three to five circles. The inside is lined with a thin layer of silk. The case is light in weight and is easily dragged about by its active occupant who, on very slight provocation, will quit the case entirely.

We are unable to give characters for separating the case of this species from those of other species of the genus.

Limnephilus combinatus Wlk.

Larval Habitat.—We have found the larvæ of this species in only two localities; Michigan Hollow, about seven miles south of Ithaca, and McLean, about eighteen miles to the north. At Michigan Hollow they inhabit the slowly flowing spring-fed stream which flows out of an upland swamp. This stream contains little or no vegetation, except the thick grass along its border. The larvæ occur most abundantly where the stream flows through an open meadow below the swamp, but are also found in the swamp itself, where alders and hemlocks form a dense thicket to the very borders of the stream. Their habitat at McLean is also a spring-fed stream with slow current, but flowing through an open deciduous forest. This stream contains grass and other vegetation along its edge and its bottom is strewn with fallen leaves. Both streams are less than five feet across; the one at Michigan Hollow is two or three feet deep while the depth of the one at McLean does not exceed a few inches.

Larva Habits.—During their early life the larvæ frequent the grass and sedges which fringe the edge of the stream, as the time for pupation draws near the larvæ wander from the edges of the stream, where marsh grass abounts to the middle of the stream where living vegetation is entirely absent. Here they attach the front end of the case firmly to some solid support, as a stick or stone. Oten many of these pupæ are found congregated on a single small stick, while on the other sticks in the region they are entirely absent.

Food of the Larvæ.—The food consists, apparently, entirely of vegetable matter. Several stomachs from specimens taken at different periods of late spring and early summer were examined. These contained only the tissue of higher plants, but it seems probable that during the cold weather, when diatoms abound, that these may compose a considerable portion of the diet of this species.

Period of Emerging.—This species is one of a very few Trichoptera known to us which emerge during a long period. On May 22 there were pupæ in the stream but no empty cases were found. On June 7 the first specimens in captivity emerged, but at that time there were many empty cases in the stream. From June 7 until July 22, when the last captive specimen emerged, their transformation in the cages was of almost daily occurrence. On the latter date, however, there were still many pupæ in the stream, and also a few prepupæ.

From this data we may assume that the species is on the wing from early June until the middle of August.

DESCRIPTION OF LARVA, PUPA AND CASE.

Larva.—Length when mature 17–20 mm.; breadth about 4.5 mm.

The Head.—The dorsal markings are shown in pl. 15, fig. 6; on the sides the head is light brown mottled with dark brown or black in the region behind the eye, as is partly shown in the figure; the venter is light brown in front, becoming darker toward the hind margin. The labrum is shown in pl. 16, fig. 14; the frons in pl. 16, fig. 22, and the labium and maxillæ, in part, in pl. 16, fig. 19.

The Thorax.—The dorsal markings and distribution of the principal setigerous punctures are shown in pl. 15, fig 6; on the sides, above each coxa, there is a dark chitinous plate bearing a group of setæ near its front margin, the venter is uniform in color. The "horn" on the ventral side of the prothorax is slender and evenly curved forward. The legs are dark brown, margined and mottled with dark brown and black.

The Abdomen.—The first segment is darker in color than the succeeding segments, it is armed with a few setæ in the region of the humps and on its ventral surface; segments two to seven bear a few minute setæ; segment eight is bordered along its hind dorsal region by a dark area which bears a row of about six setæ; segment nine curves sharply downward and is darker in color than segments two to eight, it bears a dorsal chitinous plate which is armed with four large, and several smaller setæ; segment ten is also dark in color and bears several strong setæ in the region of the drag-hooks; on the under side of each segment two to seven there is a narrow hairlike mark, oval in shape; the lateral fringe is short and black. The distribution and number of gills on the left side of the body are indicated diagrammatically in pl. 16, fig. 15.

Rupa.—Length 20–22 mm.; breadth about 5 mm. The antennæ extend back to about the hind margin of the seventh segment; on the dorsal surface of the head, between the antennæ, there is a pair of strong setæ and on the front surface, midway between the dorsal setæ and the labrum, there is a pair of similar setæ; each lobe of the labrum bears a group of stout setæ which are curved, but not hooked, at their tips. On the second and third pairs of legs the

swimming hairs are well developed. The lateral fringe is thick and black; the projections of the last segment are much as in *L. indivisus,* pl. 16, fig. 17. The dorsal surface of the first abdominal segment and the chitinous plates (the latter subject to variation in the number of teeth) are shown (left side only) in pl. 16, fig. 20.

The Case.—Length 20–25 mm.; the breadth varies greatly according to the material used in construction. The young larvæ, before they leave the grass on the stream's edge, make a case of the cross-stick type common in this genus. When, as the time for pupation draws near, they migrate away from the grassy area, their cases take on an entirely different appearance being constructed of shells, or small chunks of bark, or seeds, from the bottom. In the meadow area at Michigan Hollow the building material used, after their migration from the shore line, consisted almost entirely of the shells of water snails,—*Planorbis* and *Sphærium,* for the most part,—and of oval seeds. Pl. 15, fig. 14, shows a case from this area. Higher up in the same stream, where the waters are overhung with thickets, the larvæ use chunks of bark in the construction of their cases, pl. 15, fig. 10. Different combinations of these materials are frequently found and sometimes cases are encountered in which the front part is made of shells or chunks, while the hind part retains the cross-stick construction used in its previous environment.

Limnephilus indivisus Wlk.

Larval Habitat.—Upland pools or ponds which are rich in decaying vegetation and are subject to desiccation during the middle or latter part of summer.

In waters which it inhabits this species is found in extraordinary numbers, its cases almost covering the bottom of the pond during its late larval period.

Larval Habits.—During the period when water covers their habitat the larvæ can be found clumsily drawing their bulky cases over the bottom of the pond, or climbing over the vegetation. Their activity, apparently, does not cease during the winter months.

Food of the Larvæ.—The larvæ apparently eat vegetable matter, living or dead, with little discrimination for species or condition of preservation. They may readily be seen browsing on dead and decaying cat-tail or sedge, or on living plant tissue, or scraping loose

fibers from submerged sticks. The stomachs examined contained particles of higher plant tissue in all stages of preservation, as well as many algæ, but decaying tissue was always in greatest abundance. The dominance of decaying tissue in the stomachs may be explained by a glance at their habitat during spring, before the period of pupation. At this time the pools are full of dead and decaying cat-tails and sedges; living plants are relatively rare. The algæ are apparently swallowed accidentally with the larger plants over which, in these pools, they form a thick scum.

Pupil Habits.—Early in May, close examination of a pond where the larvæ had been found in great abundance, covering the bottom with an almost unbroken mass of moving cases, at first revealed not one inhabited larval or pupal case. They were not on the bottom, nor were they clinging to the vegetation, as is the habit of some species of the genus when pupating, nor were they under sticks or logs, nor in crevices. At last they were found deep down among the fibrous roots of sedge tussocks. Here they occurred in such numbers that they could be brought out by the handfull from every tussock. Well hidden as they were, their hiding place had been found by the muskrats of the region. Stumps and floating logs were piled by the rats with broken pupal cases from which the contents had been removed. Muskrat feces taken from these locations and disintegrated in water revealed enough chitinous fragments to indicate that the caddis pupæ were an important article of diet at this season.

On emerging the pupæ come to the surface and swim about, apparently blindly, until they encounter some suitable support projecting above the water where, climbing a few inches above the surface, they transform. The greatest number of adults were on the wing during the middle of May. At this time swarms of them clung to every nearby bush or, as dusk changed to darkness, flew over the pond.

Description of Larvæ, Pupa and Case.

Larva.—Length when mature 18–21 mm., breadth 3.5–4.5 mm. The color of the heavily chitinized parts is brown; the abdomen and weakly chitinized parts are white in young specimens, and rusty brown in individuals that are almost ready to pupate. The rust-like appearance of the weakly chitinized parts of this larva is caused by a coating which can, with difficulty, be removed, leaving the skin

white and revealing a sparse armature of very minute spines. The distribution of this rust-like coating is nearly uniform in different individuals and it seems apparent that it is a secretion from the skin.

Head.—Marked above as in pl. 15, fig. 8; the sides are light brown without sharply defined marks but, on caudal portion, bearing many small inconspicuous spots where the muscles are attached; the ventral side is uniformly light brown, except the extreme caudal portion which is crossed by the area of dark spots extending downward from the sides; the antennæ are jet black, except an area at the base, which is brown; the labrum, pl. 16, fig. 10, is light brown bordered with dark brown; the mandibles are jet black, truncate, with fine teeth and a rather sparse brush of light colored hairs on the edge of the groove; of these hairs the most cephalic are shorter and thicker.

Thorax.—The dorsal markings are shown in pl. 15, fig. 8. The prothorax bears minute forward-pointing spines on its cephalic dorsal margin; its setæ are long, some equal to the length of the segment; a raised, black, collar-like ridge extends from the base of the legs over the dorsum of the caudal margin of the segment, except at the median area, where it is broken; the ventral surface is white, except a brown mark which bears two darker marks near its caudal margin; and a small darker spot behind each leg; the fleshy horn is curved and well developed. The mesothorax is white beneath with four dark spots near the caudal margin. The metathorax is white on the under side with two broken dark marks.

Legs.—Brown with darker margin and armed with numerous long black setæ.

Abdomen.—The humps are well developed, the dorsal hump bears a pointed, finger-like process and the lateral humps are rounded; groups of setæ occur at the sides of the humps; about six large setæ and several small ones occur on the ventral surface of the first segment; other segments do not bear large setæ on their ventral surfaces; segments two to seven bear single small setæ on each side of the median line above; segment eight bears a row of about ten setæ across its ventral margin; segment nine has an oval chitinous plate on the dorsum which bears four large and many small setæ; each drag-hook has three small teeth at its base and is preceded by a chitious plate bearing about ten setæ; a row of three large setæ occurs inside of each drag-hook and behind the chitinous plate; the lateral

fringe is black and well developed, it extends from near the cephalic margin of segment three to the caudal margin of segment eight; above the lateral fringe on each segment occur minute, brown, paired spine-like processes; the gills are well-developed, their number and distribution are shown diagrammatically in pl. 16, fig. 11. The weakly chitinized portions of the entire larva are thickly set with minute spines.

Pupa.—Length 13–17 mm., breadth 4–4.5 mm. In life the color of the thorax and appendages is brown, the abdomen is green and the lateral fringe is deep black. The antennæ extend back to about the caudal margin of the eighth segment they bear groups of short setæ on the dorsal sides of the second segments; each side of the labrum bears a group of about six long hooked setæ; a row of sharp, curved, forward pointing spines borders the caudal margin of the eye; the second and third pairs of legs have well developed swimming hairs and, in advanced pupæ, show the black spines of the adult conspicuously; the lateral fringe is well developed, commencing on the caudal margin of segment five and turning under the abdomen at the caudal margin of segment eight; the gills are well developed; the last segment bears a number of setæ and two backward pointing processes, pl. 16, fig. 17.

The Larval Case.—The length and breadth vary according to the material found in its environment. It is always bulky and is usually of the cross-stick type common in the genus. It may be made of bits of leaves or plant stems or, sometimes, of seeds. When seeds are used it does not show the tendency to cross the material. The cavity is cylindrical and is always lined from end to end with a sheet of silk.

The Pupal Case.—Differs from the larval case only in having the mesh of silk across its ends as illustrated in pl. 16, fig. 12.

Chilostigma difficilis Walk.

Larval Habitat.—The larvæ of this species have been found by us in a very limited area of a stream in the McLean swamp. The stream is a small one, hardly more than a foot in width and three or four inches in depth. It rises in a sphagnum bog and penetrates a dense thicket of alder for about a half mile, when it enters a larger stream. Through the alder thicket the waters are in deep shade,

and leaves and sticks litter the bottom. In this portion of the stream, so far as we can see, there are no differences of conditions within its waters. Yet this species, for the three years we have known it, has inhabited an area of the stream not more than a hundred yards in length. In this limited area it occurs in great numbers.

Larval Habits.—Until the middle of the summer is past these larvæ rest or crawl slowly about over the bottom of the stream. As the period for pupation approaches they congregate in great numbers on submerged sticks or roots. Often they occupy every available lodging space on a certain stick while other similar sticks of the neighborhood are left entirely free from their presence. Only the front ends of the cases are attached to the support, from which they project at all angles.

Food of the Larvæ.—Stomachs examined contained quantities of fragments of wood and leaves; nothing else.

Period of Emerging.—Specimens in captivity emerged October 6–13; but it is probable that under natural conditions they emerge throughout a longer period.

Description of Larva, Pupa and Case.

Larva.—Length 16–18 mm.; breadth 2.5–3 mm.

The Head.—The color is light brown, almost uniform, except the dark circles indicating the position of the attachment of muscles and a thick stipling of microscopic spots; the dorsal surface, especially the frons, pl. 16, fig. 7, bears numerous pointed, spear-like processes which are plainly evident in balsam mounts. The labrum, pl. 16, fig. 6, is brown with a darker mark behind the middle of its front margin, the innermost setæ on its front margin are short and blade-like, the outer setæ of the front margin are longer, but blade-like, other setæ of the labrum are indicated by circles in the accompanying drawing. The mandibles are black, with a line of dense yellow hair on the top edge of the groove.

The Thorax.—The prothorax is light brown with a slightly oblique black mark on each side above the coxa; the top surface has, in addition to numerous setæ of the ordinary type, many shorter, spear-shaped, forward pointing spines, not shown in the accompanying figures; these are most numerous along the front margin, where they project over the base of the head; the dorsal markings of the

meso- and meta-thorax are shown in pl. 15, fig. 5. The legs are light brown, margined and marked with black, pl. 15, fig. 3, shows a front leg.

The Abdomen.—The lateral fringe is short and weakly developed, it extends from the front margin of the third segment to the hind margin of the eighth segment. The distribution of gills is diagrammatically shown in pl. 16, fig. 9.

Pupa.—Length 10–11 mm.; breadth 2–2.5 mm. The antennæ extend back almost to the tip of the abdomen. Each side of the upper surface of the labrum bears a group of about five long, black, hooked setæ. The mandible is shown in pl. 16, fig. 18. The lateral fringe begins near the hind margin of segment five and curves under the hind margin of segment eight; it is black in color and is much better developed than that of the larva. The last segment bears a pair of fleshy appendages. The chitinous plates of one side of the first and third to seventh abdominal segments are shown in pl. 16, fig. 1.

The Larval Case.—The case of the larva, when mature, is 15–20 mm. long; its diameter is 4 mm. or more at the cephalic end, according to the kind of material used in its construction. In form it is cylindrical, slightly curved. The larvæ, during their active period before pupation, construct their cases largely of quartz sand, but usually have a greater or lesser number of bark chunks around this inner cylinder. Sometimes, however, these bark fragments are almost, or even entirely, lacking. In preparation for pupation the larvæ usually remove almost all of the plant fragments from their cases. They then congregate in numbers on some support, as a submerged stick or root. Before pupation takes place the two openings of the case are stopped with small grains of sand firmly cemented in place. Apparently there is no mesh left open. Pl. 15, fig. 11, represents a larval case of quartz sand and a few fragments of bark.

EXPLANATION OF PLATES.

PLATE XV.

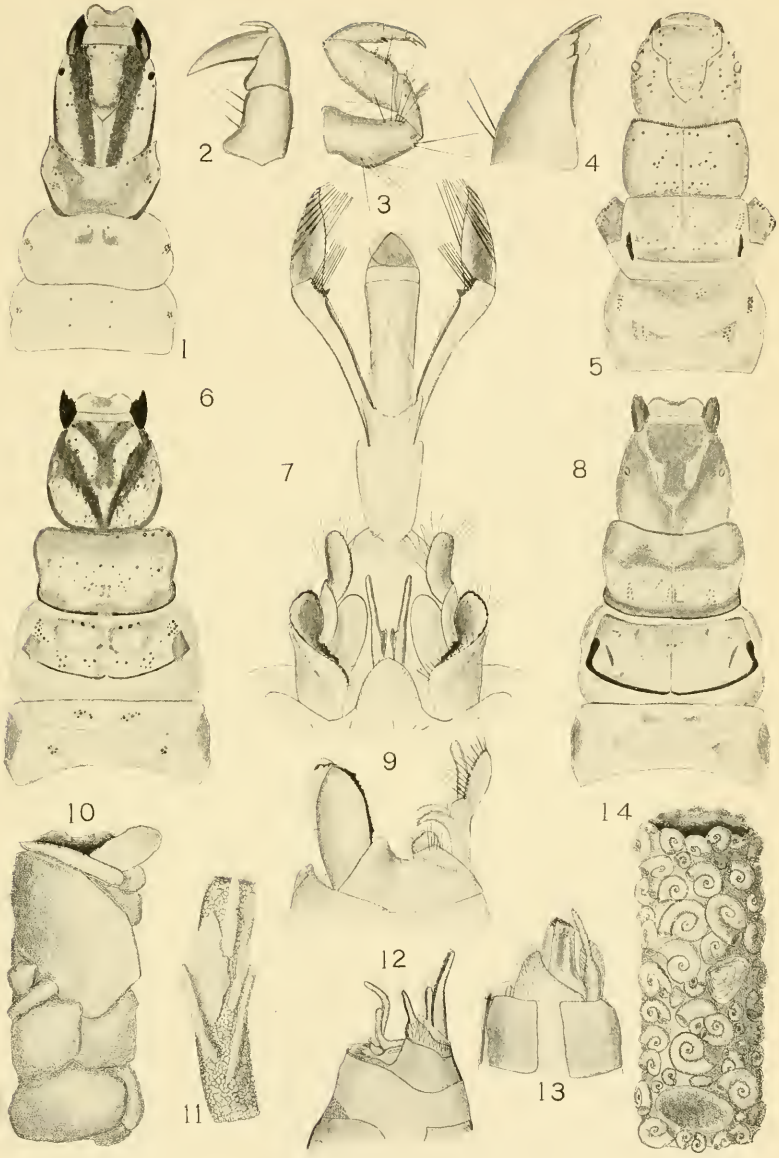
Neuronia pardalis Walk.

Larva.

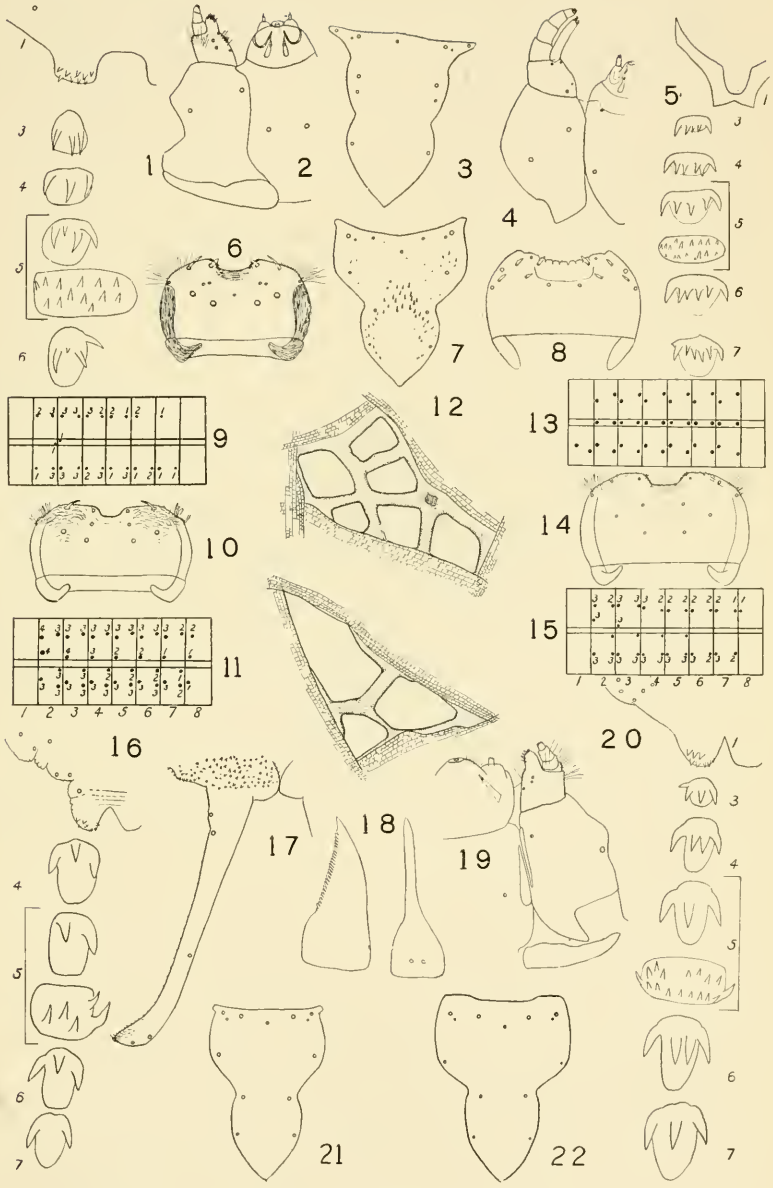
Fig. 1. Dorsal view of head and thorax. Locations of principal setæ are indicated by black dots.

Fig. 2. Drag-hook.

Fig. 4. Mandible.



Trichoptera.



Trichoptera.

Limnephilus combinatus Walk.

Adult.

Fig. 9. Lateral view of male genitalia.

Fig. 13. Lateral view of female genitalia.

Fig. 6. Dorsal view of head and thorax. Locations of principal setæ are indicated by black dots.

Fig. 10. Case.

Fig. 14. Case.

Limnephilus indivisus Walk.

Adult.

Fig. 7. Ventral view of male genitalia.

Larva.

Fig. 8. Dorsal view of head and thorax.

Chilostigma difficilis Walk.

Adult.

Fig. 12. Lateral view of male genitalia.

Larva.

Fig. 5. Dorsal view of head and thorax. Locations of principal setæ are indicated by black dots.

Fig. 3. Front leg.

Fig. 11. Case.

PLATE XVI.

Neuronia pardalis Walk.

Larva.

Fig. 3. Frons.

Fig. 4. Labium and maxilla, in part.

Fig. 8. Labrum.

Fig. 13. Diagram of left side of abdomen, segments one to eight, indicating position of gills.[1] (A single gill in each cluster in this species.)

Pupa.

Fig. 5. Chitinous plates of the left side of dorsal surface of abdomen. Numbers indicate the segments on which they occur.[2]

[1] See note 1, p. 212.

[2] See note 2, p. 212.

Limnephilus combinatus Walk.

Larva.

Fig. 14. Labrum.

Fig. 15. Diagram of left side of abdomen, segments one to eight, indicating position of gills.[1]

Fig. 19. Labium and maxilla, in part.

Fig. 22. Frons.

Pupa.

Fig. 20. Chitinous plates of the left side of dorsal surface of abdomen. Numbers indicate the segments on which they occur.[2]

Limnephilus indivisus Walk.

Larva.

Fig. 10. Labrum.

Fig. 11. Diagram of left side of abdomen, segments one to eight, indicating position of gills.[1]

Fig. 21. Frons.

Pupa.

Fig. 12. Silken sieves from front and rear ends of case.

Fig. 16. Chitinous plates of left side of dorsal surface of abdomen. Numbers indicate the segments on which they occur.[2]

Fig. 17. Appendage of one side of last segment of abdomen, ventral view. Circles indicate positions of setæ.

Chilostigma difficilis Walk.

Larva.

Fig. 2. Labium and maxilla, in part.

Fig. 6. Labrum.

Fig. 7. Frons.

Fig. 9. Diagram of left side of abdomen, segments one to eight, indicating position of gills.[1]

Pupa.

Fig. 1. Chitinous plates of the left side of dorsal surface of abdomen. Numbers indicate the segments on which they occur.

Fig. 18. Mandible, side and back views.

[1] The presence or absence of gills on the first and last segments on which they occur is subject to some variation. Also the number of gills in a cluster may vary within certain limits. The numbers near the black spots representing gills indicate the approximate number of gills in the cluster.

[2] The number of hooks on each plate and even the shape of the plate itself, is subject to variation. The form of the chitinous portion of the first abdominal segment is a more constant character than the chitinous plates of the succeeding segments.

NOTES ON SOME VIRGINIAN SPECIES OF PLATYPEZA (PLATYPEZIDAE, DIPT.)

By Nathan Banks,

Washington, D. C.

About five or six species of this genus have been recorded from the Eastern States, one of which (*P. pallipes*), goes in the genus or subgenus *Calotarsa*. Of the others there are few records. I have collected several local species and in identifying them find that five are new; several others may represent new species. There is some sexual dimorphism in the genus, so I have based the new species only on males. Johnson has claimed this dimorphism in *P. pallipes*, and what I consider the female of *P. flavicornis* differs radically in the abdominal markings and color of the halters from the male.

The species known to me are separable as follows:

Males

1. Posterior cross-vein fully its length from the hind margin ..... 2.
   Posterior cross-vein not its length from the hind margin; submedian rows of fine bristles on the mesonotum; hind tarsi black ..... 5.
2. Abdomen wholly velvety black above ..... 3.
   Abdomen not wholly velvety black above ..... 4.
3. Antennæ yellowish; fourth vein plainly bent down a little before the posterior cross-vein; third section of fourth vein much longer than fourth section of fourth vein ..... *flavicornis*.
   Antennæ dark; fourth vein not bent down before posterior cross-vein; third and fourth sections nearly subequal. ..... *minorata*.
4. Abdomen shining above, no spots on the segments ..... *nitida*.
   Abdomen with three pale pollinose spots on fourth segment .... *submacula*.
   Abdomen with velvety black median spots on fifth and sixth segments. *mediana*.
5. Abdomen with gray marginal spots ..... *tæniata*.
   Abdomen black, unspotted ..... 6.
6. Abdomen broadly rounded; costal cell extending far beyond end of first basal cell ..... *velutina*.
   Abdomen elongate; costal cell extending only a little beyond end of first basal cell ..... *elongata*.

Females.

1. Posterior cross-vein not its length from the hind margin ..... 2.
   Posterior cross-vein fully its length from the hind margin ..... 3.

2. Abdomen black above, unspotted; halteres dark ..... *velutina.*
   Abdomen gray, banded with black; halteres pale ..... *tæniata.*
3. Abdomen black, with pale lateral spots; halteres pale ..... *flavicornis.*

In this table *P. obscura* Loew would go to "2," and there separated by "Abdomen black, with pale lateral spots."

Platypeza flavicornis Loew.

Several specimens from Falls Church and Great Falls, Va., all in August.

What I consider the female of this species has little gray spots on extreme margin of the abdominal segments above, with a cinereous band across base of abdomen. It will thus agree with the description of *P. obscura* Loew, but that species is said to have the posterior cross vein near the hind margin.

Platypeza tæniata Snow.

Females from Great Falls, 9 Sept., have the bands on the abdomen not widened in the middle and thus dividing the gray. But I also have several in which the black bands are widened on middle, so that the gray is divided, and a male which also is marked on the same plan. These may form a variety or new species. These latter are from Falls Church, Aug. and Sept., and the male 15 Nov. In this species the costal cell reaches barely beyond the end of the first basal cell.

Platypeza submacula new species.

Male.—Black, face gray pollinose; basal joints of the antennæ pale; palpi pale; legs rather pale (or perhaps not fully colored). Abdomen velvety black, the fourth segment above with three large gray pollinose spots, last segment gray; halteres dark. Wings hyaline, the posterior cross-vein once and a-half its length from the margin, third section of fourth vein much longer than fourth section; the upturned section not very long; auxiliary vein ends only a little beyond anterior cross-vein. Scutellum with two bristles on hind edge. Length 2.7 mm.

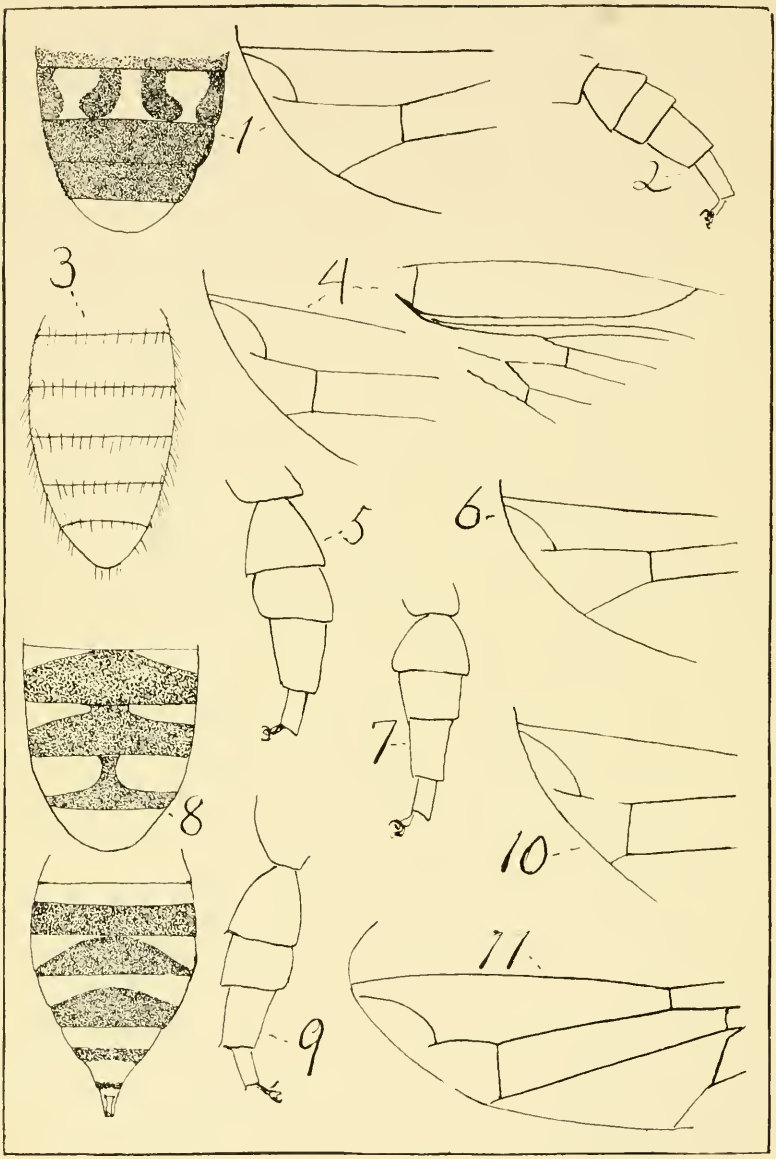
From Great Falls, Va., 9 Sept.

Platypeza velutina Loew.

Both sexes from Falls Church, in May and June.

Platypeza minorata new species.

Male.—Black, face gray pollinose; palpi pale; antennæ dark; abdomen velvety black, last segment gray; legs dark, tarsi pale, hind tarsi yellowish white; scutellum with a large bristle each side on the margin, and one or two



Platypezidæ.

smaller ones outside it. Wings hyaline, posterior cross-vein nearly twice its length from the hind margin; upturned section of fourth vein very short, but little curved, third section plainly longer than the fourth; auxiliary vein ends considerably beyond anterior cross-vein; abdomen short and broad; halteres dark. Length 2 mm.

From Falls Church, Va., 30 Aug. Several females also from Falls Church agree in general with these males.

Platypeza mediana new species.

Male.—Black; palpi and basal joints of antennæ pale; abdomen shining above, in some lights almost gray, but with two velvety black spots on middle of fifth and sixth segments, that on the sixth is nearly square, that on the fifth is much narrower and nearly pointed behind; legs black, tips of coxæ and bases of femora pale, tarsi rather pale. Wings hyaline; posterior cross-veins only a little more than its length from the margin; fourth section of fourth vein about two-thirds of third section, auxiliary vein ends a little beyond anterior cross-vein; halteres black. Scutellum with a large and small bristle each side. Abdomen short, broad, and rather flat. Length 2.5 mm.

From Falls Church, Va., 30 Aug. Differs from *P. flavicornis* in abdomen not wholly velvety black above.

Platypeza elongata new species.

Male.—Black; antennæ black; palpi dark; abdomen velvety black, except last segment which is grayish; legs black, including tarsi, but the anterior and middle knees are pale; halteres black. Wings hyaline; posterior cross-vein near margin; upturned section of fourth vein very long, fourth section no longer than second section, not one third as long as the third section; auxiliary vein ends a little beyond the anterior cross-vein. Mesonotum with submedian rows of fine bristles; scutellum with a long and one short bristle each side. Abdomen very hairy, elongate, fully equal to the head and thorax together. Length 3.3 to 3.8 mm.

From Falls Church, and Glencarlyn, Va., in Aug. and Sept. *P. authrax* is said to have margins of second and third segments reddish, and differs in minor points.

Platypeza nitida new species.

Male.—Black; face gray pollinose; palpi pale; antennæ blackish; legs black, the tarsi but little paler; abdomen shining black, but second segment velvety black, and last segment gray; halteres dark. Wings hyaline; posterior cross-vein twice its length from the margin; the upturned section of fourth vein arises near margin; the third section only a little longer than the fourth; auxiliary vein ends a long distance beyond the anterior cross-vein. Scutellum with three short bristles on each side on margin; abdomen rather broad and flat. Length 2.5 mm.

From Glencarlyn, Va., 24 June.

EXPLANATION OF PLATE XVII.

Fig. 1. *Platypeza submacula,* abdomen and part of wing.
Fig. 2. *Platypeza minorata,* hind tarsus.
Fig. 3. *Platypeza elongata,* abdomen.
Fig. 4. *Platypeza velutina,* parts of wing.
Fig. 5. *Platypeza submacula,* hind tarsus.
Fig. 6. *Platypeza nitida,* part of wing.
Fig. 7. *Platypeza elongata,* hind tarsus.
Fig. 8. *Platypeza tæniata,* abdomen, male and female variety.
Fig. 9. *Platypeza nitida,* hind tarsus.
Fig. 10. *Platypeza tæniata,* part of wing.
Fig. 11. *Platypeza elongata,* part of wing.

NEW WESTERN AND SOUTHWESTERN MUSCOIDEA

By Charles H. T. Townsend,

Washington, D. C.

The following are descriptions of some new muscoid genera and their genotypes from the western United States and the southwest of North America, including the northwest of Mexico. The region which they inhabit extends from Idaho and Yellowstone Park to Texas, California and western Chihuahua.

Family CALIRRHOIDÆ

COCKERELLIANA new genus.

Genotype, *Cockerelliana capitata* Townsend new species.

Female.—Form rather narrowed. Lower profile of head nearly three fifths of frontal profile, the occiput being lightly bulged. Facial profile retreating, the vibrissal axis distinctly less than antennal. Clypeus rather shortened, broadening but little below, carina vestigial. Epistoma elongate, narrowed distinctly by vibrissal angles. Facialia bare, flattened, rather narrow, not prominent. Vibrissæ set well above oral margin. Peristomalia long, curved in profile, with a few widely separated bristles on lower extent. Proboscis short,

fleshy, less than head-height, part below geniculation hardly as long as antennæ. Palpi well developed, hardly as long as third antennal joint, faintly thickened at tip. Antennæ inserted but little below upper eye limits, reaching well short of vibrissæ; second joint distinctly elongate, rather longer than the distance between vibrissæ and oral margin; third joint hardly twice as long as second, equilateral, about same width as tip of second, evenly rounded at tip. Arista porrect, strong, thickened, tapered to sharp point, basal joints very short. Eyes practically bare, hardly twice as long as greatest width, descending about even with tips of antennæ. Front at vertex taking up fully half of head-width, slightly widening anteriorly. Parafrontals broad anteriorly, narrowing rapidly posteriorly, with a very few scattered minute bristly hairs. Frontals descending about to tip of second antennal joint, two placed below base of antennæ, three decussate pairs above base. Verticals both well developed. Three proclinate fronto-orbitals, of which the middle one is weak and the other two strong; three strong reclinate ones in line with frontals, and one or two very weak bristles in line with and immediately behind the proclinate. Frontalia anteriorly as wide as antennal base, widening posteriorly to about twice the anterior width but not occupying quite one half the vertical width of front. Ocellars present, strong, divaricate. Parafacials above broader than clypeus, distinctly narrowed below, broadening again slightly at cheek grooves, their planes converging anteriorly at an angle of about 45 degrees; two or three downwardly-directed macrochætæ near front edge, about level with middle of third antennal joint. Cheeks a little less than one half eye-height, rather longer than broad. Cheek-grooves very faintly marked, hardly impressed but extensive, ascending broadly behind lower half of eye. No geno-orbitals. Sternopleurals, 0:2:1; postsuturals, 3; preacrostichals, 3, rather weak; postacrostichals, 3, but front one or two weak. Three strong lateral scutellars; weak closely-approximated apical pair slightly removed from edge; about four weak discals in irregular row. Wings about as long as abdomen, nearly two and one half times as long as broad. Costal spine short and stout, distinctly longer than costal bristles. Third vein bristled about to small crossvein, its course very straight beyond same. Apical cell rather narrowed, open, terminating nearly as far before wing-tip as length of apical crossvein. Fourth vein represented by wrinkle

beyond origin of apical crossvein. Cubitus quite as near to front as to hind margin of wing; the apical crossvein at origin set at hardly more than a right angle, rather evenly and gently bowed in. Hind crossvein regularly sinuate, its axis almost parallel with that of the apical, distinctly nearer to latter than to small crossvein. Tegulæ large, naked, the small scale not much over one fifth the size of the other. Legs not elongate. Hind tibiæ subpectinate, with longer bristle. Metatarsi of usual length, front tarsi unmodified. Claws shorter than last tarsal joint. Abdomen elongate-subconical, not wider than thorax; no median macrochætæ on first segment, but one lateral discal and one lateral marginal; second with median marginal pair and lateral marginal pair; third with marginal row of ten or twelve including ventral; fourth with marginal row of ten.

Named in honor of Dr. T. D. A. Cockerell.

Cockerelliana capitata new species.

Length of body, 9.5 mm.; of wing, 6 mm. One female, Albuquerque, New Mexico, June 30 (Cockerell).

Brown or blackish in ground color, the venter and especially cheeks and face less deeply colored. Head with silvery bloom over all except anterior part of frontalia and subrectangular blotch marking junction of parafacials and parafrontals. Ground color of cheeks, face and frontalia fulvous-brown. First two antennal joints and palpi reddish-fulvous. Thorax, scutellum and abdomen silvery; thorax with two narrow median and two heavier outer vittæ; pollen of abdomen concentrated on anterior three fifths of second and third and anterior half of fourth segments, leaving all of first and broad hind margins of second to fourth subshining blackish. Legs black. Wings clear to whitish, veins yellowish to brownish-yellow at base. Tegulæ nearly white.

Holotype, No. 19560 U. S. N. M.

PARAMUSCOPTERYX new genus.

Genotype, *Paramuscopteryx genalis* Townsend new species.

Differs from *Muscopteryx* as follows: Female.—Vertex one third head width, front broadening rapidly. Parafacials with irregular double row of bristles, extending fully to lower end of eyes. Two proclinate fronto-orbitals. One pair of divaricate inner fronto-orbitals. Vibrissæ level with oral margin, from four to six closely-placed bristles above them. Cheeks nearly or quite three fourths of eye-height. Antennæ fully three fourths length of face, third joint fully one and one half times as long as second; arista thickened on

basal half, tapering. Palpi large, stout, thickened at tip. Scutellum with a weak divaricate apical pair of bristles, and three laterals, also some weak but long subapicals and discals. Abdomen wider than thorax, broad-ovate, discal macrochætæ on all the segments even including the first. Wings broad. Cubitus with short stump, apical crossvein nearly or quite straight. Claws rather short.

Male.—Vertex about one seventh of head width, front same width a little less than half way to base of antennæ before broadening rapidly. Parafrontals and parafacials a little more thickly set with hairs. No fronto-orbitals either inner or outer, verticals hairlike and vestigial. Cheeks fully one half eye height. Third antennal joint proportionally longer, narrower, but hardly twice second; arista thickened on basal third. Palpi not so stout, but long and slightly thickened apically. Abdomen slightly narrower than thorax, elongate-subconical, discals and anteromarginals present. Wings narrow. Cubitus without stump, apical crossvein more bowed in. Claws very elongate, the front ones much longer than last tarsal joint.

Paramuscopteryx genalis new species.

Length of body, 8 mm.; of wing, 6 mm. One male and one female, Moscow, Idaho (Aldrich).

Shining black, head and thorax thinly silvery, frontalia and first two antennal joints black in female and brown in male, palpi blackish-rufous in male and obscure dark rufous in female. Abdomen of female showing pollen only on narrow bases of last three segments, that of male with pollen more general but rather heavier on bases of segments. Male abdomen is more brownish, especially venter. Legs black or brownish. Wings clear. Tegulæ yellowish-white. (The male may not belong here.)

Holotype, No. 19614 U. S. N. M. Female. Allotype, male. The holotype bears label "*Muscopteryx chætosula* Towns." placed there by Coquillett, but this is not the species referred to under that name in Rev. Tach. 125. (Vide *Metopomuscopteryx tibialis*.)

METOPOMUSCOPTERYX new genus.

Genotype, *Muscopteryx tibialis* Coquillett, 1902, Proc. U. S. Nat. Mus., XXV, 115. It is to be noted here that the specimen cited by Coquillett under *Muscopteryx chætosula* in Rev. Tach., 125 (length 9 mm., Missouri), is a male of *tibialis* with the single label "Collection C. V. Riley."

Differs from *Paramuscopteryx* as follows: Macrochætæ much

longer, those of female strong but slender, those of male head hairlike except vibrissæ. Eyes thickly hairy in both sexes. Front strongly produced, the head profile very suggestive of that of *Eutrixa* but the front more produced; male vertex about one sixth of head width, or a little less; female vertex less than one third head width; frontalia much broader. Third antennal joint hardly longer than second in both sexes, second joint thickly set with short sharp spines; arista thickened on basal third. Cheeks over one half eye height in both sexes. Vibrissæ double, set well above oral margin. Palpi very slender, subfiliform. Only two lateral scutellars, apical pair decussate and long but weak. Abdominal macrochætæ rather thickly placed over whole tergum, erect and very long, curved, only a lateral bare space on each side of front portion which is smaller in male than in female. Venter with fine hairs. Legs very spinose, male femora more hairy, male claws very long. Wings narrow in both sexes, costal spine small, veins heavy; apical cell narrowly open or almost closed, ending well before wing tip; apical crossvein deeply bowed in; usually strong stump at cubitus which is sharply angled. Abdomen about same width as thorax in both sexes.

Family MELANOPHORIDÆ.

HESPEROPHASIA new genus.

Genotype, *Hesperophasia sctosa* Townsend new species.

Differs from *Hesperomyia* BB. as follows: Peristomal and frontal bristles about equal, delicate; a row of three or four proclinate fronto-orbital bristles in male continued on parafacials to lower border of eyes, all noticeably stronger than the frontals. Plane of parafacials almost same as that of facial plate. Second antennal joint fully as long as third, or slightly longer; arista very delicate, distinctly swollen on extreme base. Front of male narrowed on more than posterior half to little over one-eighth head width. Antennæ of male nearly reaching oral margin. Front in profile scarcely bulged, the face conspicuously receding. Cheek-grooves extending narrowly upward behind eyes. Hind cross vein straight, about in middle between small crossvein and bend of fourth; only the final course of apical crossvein nearly or quite parallel with same; crossveins far from parallel with inner wing-margin; fourth vein without stump at bend, third bristly half

way or more to small crossvein. Scutellum with three pairs of marginal macrochætæ, the apical pair decussate and moderately long; the middle pair extraordinarily long, curved and reaching to or beyond base of third segment though suberect; two long straight erect weak discal pairs, about as long as the front marginal and shorter than the apical. Wings and abdomen both narrow. Male abdomen with a median marginal pair of erect macrochætæ on each of the four segments, a lateral marginal on segments one to three, two or three lateral marginal on anal segment. Hairs of abdomen rather short, appressed. Hind tibiæ not ciliate, male claws about as long as last tarsal joint; front metatarsi thickened, also front tibiæ distally. Spine at base of hind metatarsi, front ones with several vestigial spines. Vibrissal angles not convergent, on oral margin, latter cut off.

Hesperophasia setosa new species.

Length of body, scant 5 mm.; of wing, 3.5 mm. One male, Rio Ruidoso, White Mts., New Mexico, 6500 ft., on flowers of *Geranium atropurpureum*, August, 1898 (Townsend).

Black, the front and face lightly silvery, the parafacials and parafrontals with a row of shining black dots marking the origin of bristles, similar dots less well defined also marking the origin of the anterior frontal bristles. Antennæ soft blackish, with faint grayish bloom; palpi blackish. Mesoscutum, scutellum and abdomen polished, with purplish luster, showing practically no pollen or only the faintest trace on thorax in very oblique lights. Legs black, femora brown, tibiæ faintly tinged with brown. Wings clear except the smoky costal and subcostal cells; tegulæ pale with fuscous borders.

Holotype, No. 19561 U. S. N. M.

HESPEROPHASIOPSIS new genus.

Genotype, *Hesperophasiopsis californica* Townsend new species.

Differs from *Hesperophasia* Townsend as follows: Sparse row of weak bristly hairs on parafacials in front of orbital row. Second antennal joint not so elongate, the third slightly longer than second. Front of male narrowed in middle to about or nearly one fifth head width, the borders arcuate, the front widening evenly to vertex as well as to lunula. Parafacials broader and not in plane of facial plate, normal. Cheeks quite one half eye height, or slightly more. Antennæ of male reaching little more than three fourths way to oral margin. Hind crossvein practically parallel with apical, a little nearer

to bend of fourth; crossveins not parallel with inner wing margin, third vein bristly to small crossvein. Wings broader, bend of fourth vein almost as close to front margin as to inner margin of wing. Scutellar bristles weaker and shorter. Abdomen broader, no median marginal macrochætæ on first two segments in male, two median marginal and three lateral marginal on third segment; anal segment with discal row, and with weak marginal bristles. Hind metatarsi with spine at base on inner surface, the front ones hardly thickened and with several spines at base. Cheek grooves broadly extended obliquely upward under whole length of eyes to middle of occipital profile, very conspicuous.

Hesperophasiopsis californica new species.

Length of body, 5 mm.; of wing, 3.75 mm. One male, San Diego County, California, March 8, 1897 (labeled by Coquillett "*Hesperomyia erythrocera* B. & B.").

Color description of *Hesperophasia setosa* T. applies to this species with following changes: Antennæ and palpi wholly rufous, cheek-grooves conspicuously silver-burnished with oblique band. Wings very faintly smoky throughout, the costal portion a little more deeply so. Tegulæ more nearly whitish throughout. Legs brownish, tarsi darker. Thorax and abdomen with dull green luster, as well as dark parts of head.

Holotype, No. 19562 U. S. N. M.

Family SALMACIIDÆ.

GONIOCNEPHALIA new genus.

Genotype, *Goniocnephalia melanica* Townsend new species.

Intermediate between *Knabia* and *Cnephalia*. Belongs in the Spallanzaniini. Differs from *Knabia* as follows: Male only described. Lower border of head longer, the facial profile not receding. Head bristles considerably stronger. Second aristal joint only moderately elongate. Proboscis below geniculation as long as lower border of head. Parafacials sparsely set with short irregularly placed bristles, without hair; no hair on cheeks, very little hair on parafrontals and that only posteriorly; no marginal row of bristles on parafacials. Body hair not quite so well developed. Cubitus distinctly nearer to hind margin of wing. Legs stouter, claws very elongate.

Goniocnephalia melanica new species.

Length of body, 12 mm.; of wing, 8.5 mm. One male, Las Vegas Mts., New Mexico, 11,000 ft., June, 1901 (Cockerell).

Differs from color description of *Knabia hirsuta* only as follows: Third antennal joint quite as black as arista. Outer pair of thoracic vittæ a little widened. Scutellum all testaceous except extreme narrow basal margin. Pollen bands of abdominal segments two to four broader, less well defined, more ashy in color. Wings wholly clear. Tegulæ watery-white.

Holotype, No. 19563 U. S. N. M.

PARAPHASMOPHAGA new genus.

Genotype, *Paraphasmophaga clavis* Townsend new species.

Would run to *Phasmophaga* Townsend in table (Ann. Ent. Soc. Amer., II., 245) but for long-petiolate apical cell, long stump at origin of apical crossvein, short and thick nail-like arista, no orbitals in male but front wide, facialia ciliate far up. Approaches *Paradmontia* Coquillett in the petiolate apical cell but petiole terminates far before wingtip, third vein bristly to small crossvein, arista short and thickened but second joint not elongate, parafacials bare but bristles on facialia.

Profile of parafacials and facialia strongly bulged, the lower border of head very short and rather rounded. Proboscis very short, palpi small and slender. Facial depression of male deeply excavated, the third antennal joint greatly elongated and extending to the cut-off oral margin, the second antennal joint excessively shortened. Vibrissæ on oral margin not longer than the peristomal bristles next to them. Eyes only very faintly hairy, front of male rather less than one half head width, parafacials about one half eye width, cheeks nearly one third eye height. Ocellar bristles present, widely divaricate. Origin of apical crossvein almost half way between front and hind margins of wing. Hind crossvein short and nearly straight, slightly nearer to small crossvein. First segment of abdomen with a small median marginal pair of macrochætæ, the following segments with median discal and marginal pairs, the anal segment with discal and marginal rows. Legs short, the claws of male short. Parafrontals with extra bristles and bristly hairs outside frontal rows. Frontalia broader than parafrontals, nearly as broad as distance between lunula and ocellar area. Arista porrect. Cilia of facialia directed downward. Ptilinal suture extending below eyes, about to vibrissal angles.

Paraphasmophaga clavis new species.

Length of body, 5.5 mm.; of wing, 3.75 mm. One male, October 9, mesa east of Las Cruces, New Mexico, 4000 ft. (Townsend).

Shining black, frontalia yellowish rufous, extreme base of antennæ rufous, face and front distinctly silvery. Mesoscutum thinly silvery before suture, vittæ faint. Wings clear, tegulæ white. Legs wholly soft black. Third antennal joint black with a faint grayish bloom, arista soft black. Ptilinal suture rufous.

Holotype, No. 19564 U. S. N. M.

Family CROCUTIDÆ.

PHASIOSTOMA new genus.

Genotype, *Phasiostoma aristalis* Townsend new species.

Differs from *Epigrimyia* as follows: Male.—Vertex about three sevenths of head width, front slightly widening from same; face above middle slightly constricted from anterior frontal width, widening slightly below. Outer verticals short, ocellars weaker; two reclinate fronto-orbitals; two moderately strong proclinate fronto-orbitals, often a third weaker one in front of these with microchætæ forming a continuation anteriorly in line with same as far as end of frontals, latter reaching end of second antennal joint. Frontalia averaging about as wide as one parafrontal, sometimes wider. Facialia quite strongly diverging downwardly, their surface pressed flat and even with that of the very narrowed parafacials, furnished with short microchætæ nearly or more than half way up. Epistoma much projected anteriorly between the vibrissæ, the oral margin arcuate, the profile of epistoma projected from that of clypeus in a rather even curve, the mouth very suggestive of the Phasiid type but epistoma more prominent. Proboscis rather stout, the part below geniculation little more than two thirds head height. Palpi shorter. Eyes not reaching vibrissæ, the cheeks about two fifths of eye height. Antennæ reaching oral margin; third joint straight on upper edge, slightly widened distally, evenly curved on under edge and tip in profile; arista as long as third antennal joint, geniculate, thickened to tip, first joint rather longer than broad, second nearly or quite as long as third. Antennæ inserted even with upper border of eyes, antennal axis of head hardly as great as vibrissal and conspicuously less than oral axis. Four sternopleurals; median marginal pair of first segment small, third and fourth segments with marginal row. Hypopygium heavier, more elongate, with broader forceps. Middle and hind tarsi normally longer than corresponding tibiæ; tarsi very

slender, claws very short. Costal spine small, third vein with one bristle, at base, cubitus nearer wing-margin, hind crossvein nearer to small crossvein; wings not quite so shortened.

Phasiostoma aristalis new species.

Length of body, 3.5 to 4.5 mm.; of wing, 3 to 4 mm. Six males as follows: Pecos, June 2 (Ckll.) and August 21 (W. P. Ckll.); Beulah, July 15 and August (Ckll.); Sante Fe, July (Ckll., 3865); and Las Vegas Hot Springs, August 19 (H. S. Barber), all in New Mexico.

Testaceous, ashy to silvery pollinose. Face silvery; front, thorax and scutellum cinereous; abdomen silvery on narrow bases of segments, thinly ashy on rest. Legs testaceous to flavotestaceous, tarsi black. Wings clear, tegulæ pearly-white. Antennæ black. Palpi nearly concolorous with legs. Frontalia pollinose, showing tawny-flavous in oblique view, blackish in middle by direct view.

Holotype, No. 19621 U. S. N. M., Pecos, June 2.

PHANTASIOMYIA new genus.

Genotype, *Phantasiomyia gracilis* Townsend new species.

Differs from *Phasiostoma* as follows: Male.—Vertex about one third of head width; face not constricted, fully one half head width below. Eyes thinly hairy; no outer vertical, only one reclinate and one or two proclinate fronto-orbitals, frontals descending about to arista. Two pairs of weak ocellars; microchætæ of parafrontals descending lower than frontals. Frontalia broader than one parafrontal. Facial depression broad, long; the facialia not flattened to parafacial level, ciliate about one third way up. Epistoma only slightly prominent, of the arcuate type but well cut off and but little projected. Proboscis shorter. Antennæ much elongated, the second joint short; third joint six or seven times as long as second, heavy, subequilateral, rounded-subtruncate at tip. Arista long, the second joint well elongated but only one fourth or one fifth the length of third, the latter tapered at tip. Head subrectangular in profile, the oral and vibrissal axes equalling the antennal axis. Three sternopleurals. No complete marginal row of strong macrochætæ on third segment. Wings rather longer, costal spine completely atrophied, third vein bristled over half way to small crossvein. Cubitus removed from margin, hind crossvein only slightly nearer to cubitus than to small crossvein. Tarsi rather heavier, gently tapering to tips.

Phantasiomyia gracilis new species.

Length of body, 6 to 6.5 mm.; of wing, 5 mm. Three males, Beulah, New Mexico, one July , 1902, the others July 15 (Cockerell).

Antennæ, frontalia and palpi rufoflavous, the third antennal joint tinged with fuscous on apical portion and upper edge; arista blackish. Head silvery; parafrontals, mesoscutum and scutellum cinereous; pleuræ silvery; abdomen silvery on narrow bases of segments, rest thickly pollinose with rather more of a brassy tinge than mesoscutum. Femora brown, tibiæ testaceous, tarsi black. Wings clear, tegulæ white.

Holotype, No. 19620 U. S. N. M.

Family MINTHOIDÆ.

POLIDEOSOMA new genus.

Genotype, *Polideosoma rohweri* Townsend new species.

Male. Form narrowed. Frontal one and one half times lower profile of head. Facial profile well receding. Antennal one and one half times vibrissal axis. Clypeus rather broad, slightly wider below than above; carina very faint. Epistoma rather cut off, the edge faintly prominent. Facialia wholly bare, sharp. Vibrissæ exactly on oral margin. Peristomalia short, widely separated, with bristles much weaker than vibrissæ. Proboscis very short and fleshy, part below geniculation about one half length of third antennal joint. Palpi small, a little thickened at tip. Antennæ inserted far above eye-middle, near upper eye-limits; second joint very short; third joint about six times as long as second, rather heavy, dilated and subtruncate apically, the front apical corner produced, the front edge thus concave in profile. Arista about as long as third antennal joint, enlarged on basal half, thence tapering evenly to tip; the basal joints short but both distinct, each as long as broad. Eyes practically bare, rounded, almost as broad as high. Front equilateral, slightly wider than one eye. Parafrontalia with fine short bristly hairs on orbital edges. Three frontals on each side, descending about to end of second antennal joint. Inner verticals long, straight, reclinate, not decussate; outer ones one half as long, divaricate. Four proclinate fronto-orbitals on each side, the front and hind ones weak; two reclinate on each side, hind ones divaricate. Frontalia in front about three fifths as wide as parafrontalia, widening rapidly behind to nearly fill front where the arms enclose ocellar area. Ocellars present, proclinate-divaricate. Parafacialia rather narrow, elongate, with some faint

minute hairs on orbital edge, and seven downwardly-curved bristles forming a row parallel with facialia. Cheeks rather over one half eye-height. Cheek grooves restricted, short. Several stronger bristles on front portion of occipital area of cheeks. Sternopleurals, 0:1:1; postsuturals, 3; preacrostichals, 2; postacrostichals, 1 front one, the middle and hind ones showing as minute hairs. Two lateral scutellars, the posterior one reaching to base of third abdominal segment; a reclinate decussate apical pair, as strong as anterior lateral; two weak erect approximated discals placed far forward. Wings longer than abdomen, not broadened. Costal spine strong, erect; a second shorter one more or less appressed to costa. Third vein bristled to small crossvein. Apical cell with petiole about as long as hind crossvein, petiole formed by third vein. Apical crossvein originating from cubitus at obtuse angle, very faintly sinuate; cubitus without appendage. Hind crossvein straight, slightly nearer to cubitus than to small crossvein, set at an angle of about 45 degrees to the hind margin of wing, not parallel with apical crossvein. Tegulæ large, subrounded, front scale hardly one fourth the size of hind scale. Legs short. Hind tibiæ subpectinate, with about three long and seven short bristles on outer edge. Metatarsi about twice as long as second tarsal joint, except posterior pair which are one and two thirds times second joint. Claws hardly as long as last tarsal joint. Abdomen elongate-oval, no wider than thorax; tip broadly subtruncate, its edge slightly concave; first segment with one lateral marginal macrochæta; second with one median discal pair, one median marginal pair, two lateral marginal and one weak lateral discal; third with one median discal pair, one median marginal pair, two lateral marginal and several weak marginal; fourth well covered with strong ones. Hypopygium with rather slender forceps.

Polideosoma rohweri new species.

Length of body, 5 mm.; of wing, 3.75 mm. One male, Florissant, Colorado, June 16, 1907 (S. A. Rohwer).

Black. Head silvery pollinose; antennæ and frontalia brown or blackish, with bloom; arista black. Beard white. Palpi obscurely rufous. Thorax shining black, with faint bloom, showing three heavy broad vittæ behind in oblique view. Scutellum and abdomen shining polished black, without bloom. Legs black with a brownish tinge. Wings clear. Tegulæ watery-whitish.

Holotype, No. 19568 U. S. N. M.

Named in honor of Mr. S. A. Rohwer.

Family LARVÆVORIDÆ.

OSTRACOPHYTO new genus.

Genotype, *Ostracophyto aristalis* Townsend new species.

Differs from *Metaphyto* (genotype, *genalis* Coquillett) as follows: Female front at vertex hardly more than one third head width; frontal, vertical and orbital bristles much stronger, also ocellar bristles; second antennal joint short, first and second aristal joints elongate, arista thickened nearly to tip which is strong and sharp-pointed; palpi shorter and more slender, a little widened at tip; frontal bristles descending as low as base of arista, closely placed. Abdomen with strong median discal and marginal bristles on intermediate segments, anal segment with discal and marginal rows. Apical cell short petiolate, hind crossvein strongly sinuate.

Ostracophyto aristalis new species.

Length of body, 8 to 10 mm.; of wing, 7 to 9 mm. Two females, Woodside, California, April 25, 1906; Santa Clara county, California, April, 1902 (Coleman).

Black, rather shining. Face and front silvery pollinose, the parafrontals showing largely blackish through the pollen, which here has a faint brassy tinge. Frontalia dark brown, first two antennal joints slightly rufous, arista soft black. Palpi yellowish, their bases fuscous. Thorax and abdomen thinly and irregularly silvery pollinose; four equal deep black vittæ on thorax; scutellum yellowish on disk. Wings clear, veins dark brown; crossveins slightly clouded, especially small crossvein. Legs wholly black. Tegulæ white.

Holotype, No. 19570 U. S. N. M.

The holotype, which is the Woodside specimen, was labeled by Coquillett "*Metaphyto aristalis* Coq.," but I can not find that the species was ever published.

UPODEMOCERA new genus.

Genotype, *Upodemocera robinsoni* Townsend new species.

Differs from *Fabriciella* as follows: Male.—Front at vertex nearly or quite as wide as one eye. Profile of third antennal joint like that of a shoe, the upper apical corner being greatly prolonged into an angle and the lower edge at the same time bulged strongly. First aristal joint very elongate, second twice as long as first and fully half as long as last joint. Hypopygium massive, much larger. Lobes of

edge of second genital segment set with short spines. Ventral plate three with thick brush of shorter sharp bristle-like spines; those of two and five being long and hairlike as in *Fabriciella,* but more thickly set. Claws nearly or quite twice as long as last tarsal joint.

Upodemocera robinsoni new species.

Length of body, 16.5 mm.; of wing, 12.5 mm. One male, Yellowstone Park, July 17, 1907 (W. Robinson).

Head very pale golden pollinose. Facial plate pale honey-yellow. Antennæ blackish or brown, except the reddish articulations. Palpi fulvorufous. Frontalia reddish-brown. Parafrontals shining black on inside edge, vertex and ocellar area same. Thorax black, shining, with only the faintest sign of bloom in oblique light. Scutellum pale testaceous. Abdomen shining blackish, broadly obscure deep rufous on sides of second and third segments. Legs black. Pulvilli same shade as epistoma. Claws about shade of palpi, tips black. Wings nearly clear, pale yellow at base, veins deep yellow. Tegulæ pale yellowish, the front scale more whitish.

Holotype, No. 19571 U. S. N. M.

Named in honor of Mr. W. Robinson.

PALPOTACHINA new genus.

Genotype, *Palpotachina similis* Townsend new species.

General form and appearance of *Peleteria;* but, though belonging in a distinct group, the genotype approximates more nearly the head characters and coloration type of *Protodejeania hystricosa,* from which genus *Palpotachina* may be distinguished by the following characters: Male only described. Proboscis and palpi practically same, though both may run a little shorter. Cheeks not so wide, only a little over one half eye height. Epistoma not quite so produced. Frontalia wider, averaging quite one third of frontal width. Third antennal joint moderately broad, about same length as second, straight on front edge, truncate at tip but corners not angular. Frontal and all head macrochætæ a little stronger. Scutellum with two long heavy laterals, a shorter decussate apical pair, a still shorter discal separated pair, these all curved and subappressed; a subapical approximated pair, erect, spinelike but not heavy; also a few short straight ones on disk. Abdomen not broadened, slightly wider than thorax, Peleteria-like. Second segment bearing a median marginal strong erect pair of macrochætæ, with two short erect ones between them and slightly nearer margin. Third segment bearing submarginal row

of heavy erect ones, with marginal row of short erect ones immediately behind them. Fourth segment with two transverse discal rows, besides marginal bristles, the whole covering over posterior half of segment. Middle and hind tibiæ with much heavier spines. Cubitus far removed from hind margin of wing, sometimes with very short stump and always with wrinkle pronounced.

Palpotachina similis new species.

Length of body (flexed), 11 mm.; of wing, 9 mm. One male, head of Rio Piedras Verdes canyon, Sierra Madre of Chihuahua, Mexico, about 7300 ft., August 14, 1899 (Townsend).

Head silvery-white pollinose, frontalia testaceous, first two antennal joints and base of third rufous; parafrontals brassy, a faint tinge of same spreading over parafacials and cheeks. Occiput brassy-gray pollinose, with pale yellow beard. Palpi fulvous. Thorax and legs black; humeri, broad lateral and hind borders of mesoscutum and all of scutellum yellowish-testaceous; the dark parts with silvery bloom, the lighter parts with brassy-gray bloom; tibiæ rufous. Abdomen clear rufous-yellow; the postscutellar triangle black; an ill-defined reverse triangle on anal segment black but fading out behind, the hind border of segment broadly rufous. Venter all yellow except broad hind border of anal segment. Hypopygium brown to blackish on exposed surface, the unexposed rufous. Wings evenly lightly smoky. Wing bases and tegulæ pale rust-yellow, the hind scale more or less white on disk.

Holotype, No. 19572 U. S. N. M.

Family EXORISTIDÆ.

CHRYSOMASICERA new genus.

Genotype, *Chrysomasicera borealis* Townsend new species.

Differs from *Chrysoëxorista* as follows: Form much broader. Discals of abdomen often doubled in female, a second pair near front margin of third segment. Apical scutellar bristles quite long, decussate. Male claws very elongate. Venter and posterior part of abdomen hairy in male. Male vertex not over one fourth head width, that of female a little under one third same. Cheeks less than one third eye height in female, over one third same in male. Cubitus angular rather than rounded. The eyes are thickly pilose in both sexes.

Chrysomasicera borealis new species.

Length of body, 9 to 10.25 mm.; of wing, 8 to 9 mm. One male, top of Las Vegas Range, above Beulah, New Mexico, in the Hudsonian zone, June 28

(Cockerell); one female, Las Vegas Hot Springs, New Mexico, August 9 (H. S. Barber).

Differs from color description of *Chrysoëxorista viridis* only as follows: Second antennal joint obscurely rufous, wings with a very faint fuscous tinge. The inner thoracic vittæ are rather more linear. A median fifth vitta nearly as dark as the others, but, unlike the others, fading with incidence of light, as is the case in *Chrysoëx. viridis*. A label by Cockerell on the male reads: "In life brilliant golden shot with green."

Holotype, No. 19613 U. S. N. M., male. Allotype, female.

Exorista ochracca Wulp probably belongs to this genus. It is described as having only four thoracic vittæ, the inner pair not extended behind the suture, the antennæ wholly black, eyes thinly pilose, and is very much smaller.

PHŒNICIOMYIA new genus.

Genotype, *Phœniciomyia arizonica* Townsend new species.

Differs from *Tachinophyto* as follows: Male.—Cheeks and parafacials narrower, front about one third head width. Second antennal joint hardly so elongate, the third joint two and one half or nearly three times second. Two or three sternopleurals, three postsuturals; three strong lateral scutellars, apical decussate pair not erect. All segments with median marginal, last three with median discal, last two with marginal row, all erect. Apical cell closed in border, ending far before wing-tip; cubitus angular, half way between front and hind margin of wing; apical crossvein well bowed in, subparallel with hind margin of wing; hind crossvein nearly half way between cubitus and small crossvein, sinuate, subparallel with apical crossvein; last section of fifth vein more than half as long as preceding section, but not nearly as long as same. Costal spine distinct, third vein bristled nearly to small crossvein. Hypopygium larger. Claws a little longer.

Phœniciomyia arizonica new species.

Length of body, 6.5 mm.; of wing, 4.75 mm. One male, Phœnix, Arizona, March 31 (Cockerell).

Black, with silvery pollen. Head silvery-whitish, frontalia brownish-red, palpi light rufous; antennæ blackish, first two joints brownish. Thorax and scutellum silvery; four thoracic vittæ, the inner pair linear. Abdomen polished black, the bases of segments two and three rather broadly densely silvery-white pollinose, base of anal segment a little less broadly so. Legs black. Wings clear. Tegulæ white.

Holotype, No. 19616 U. S. N. M.

ORGANOMYIA new genus.

Genotype, *Organomyia frontalis* Townsend new species.

Allied to both *Pseudatractocera* and *Macromeigenia*, differing from former as follows: Male.—Front very prominent in profile, the parafacials and front forming a cone with the base of antennæ as the apex. Front at vertex over one and one third times eye width, widening anteriorly. Parafrontals twice as wide anteriorly as posteriorly; with three rows of bristles outside frontals, of which the innermost are stronger and extend half way down parafacials, the others extending not so low but far below frontals. Frontalia of even width before ocellar divergence, being same width as base of antennæ and less than half anterior width of parafrontals. Frontals not very strong, descending to base of third antennal joint. Two reclinate fronto-orbitals. Outer vertical hardly longer than the occipito-orbital fringe. Parafacials very broad and long, quite equilateral, about as broad as anterior part of parafrontals, and nearly or quite as wide as distance between facialia. Cheeks a little under one half eye height. Facial depression very long and deep, broad all way up, only slightly narrowing above; epistoma sufficiently produced to bring oral margin even with facialia crests. Facialia bare, rather sharply crested; vibrissæ but slightly above oral margin. Second antennal joint slightly elongate; third joint very long, equilateral, over five times as long as second; arista curved, thickened nearly to tip, a little over one half as long as third antennal joint, basal joints short. Eyes moderately thickly hairy. Only two or three short discal scutellars, a slender decussate apical pair of same length, and only three laterals. No median macrochætæ on first segment, a median discal pair on second and third, a well-marked discal row on fourth. Apical cell closed in margin. Cubitus a little more removed from hind margin. Apical crossvein at point of origin forming sharp right angle with fourth vein, well bent in. Hind crossvein much nearer to cubitus than to small crossvein. Hind tibiæ weakly pectinate. Claws very long, conspicuously longer than last tarsal joint.

Organomyia frontalis new species.

Length of body, 9 mm.; of wing, 7 mm. One male, Organ, at north end of Organ Mts., New Mexico, September 27, 1896 (Townsend).

Blackish. Head silvery pollinose, epistoma and facial crests brownish-fulvous. Frontalia dark brown. Palpi and first two antennal joints rufous.

Thorax silvery; with five blackish vittæ, the three middle ones so approximated as to be almost confluent, the middle one and the two outer ones reaching further back than the other two. Scutellum fulvotestaceous apically, all silvery. Abdomen silvery, the second and third segments with large subrectangular blackish markings that wax and wane according to light incidence; first segment black. Legs blackish. Wings clear. Tegulæ white.

Holotype, No. 19576 U. S. N. M.

Family RHODOGYNIDÆ.

ODONTOCYPTERA new genus.

Genotype, *Odontocyptera nana* Townsend new species.

Differs from *Neocyptera* as follows: Female.—A spinigerous tubercle present on venter of second abdominal segment, formed by inner ends of tergal sclerites. First abdominal segment no longer than second. Basal segment of hypopygium more elongated. Abdomen of equal width behind basal constriction. There is a delicate straw-colored chitinous piercer. The spines of tubercle are directed posteriorly and function in holding host during act of oviposition.

This genus might easily be confused with *Bcsseria,* but is very distinct, as shown by venation and other characters.

Odontocyptera nana new species.

Length of body, 5.5 mm.; of wing, 4.5 mm. One female, Head of Rio Piedras Verdes, about 7,300 feet, Sierra Madre of Chihuahua, Mexico, July 14, 1899 (Townsend).

Differs from *Neocyptera dosiades* Walker in coloring only as follows: First abdominal segment red except broad median truncate triangle above, sides of base and median vitta on venter; leaving sides broadly red behind. Second segment all red except broad median vitta above in continuation of the truncation of triangle, and the spinigerous tubercle of venter. Third segment red except only reversed irregular triangle above which is continuous with black of anal segment and hypopygium.

Holotype, No. 19577 U. S. N. M.

CYCLODIONÆA new genus.

Genotype, *Cyclodionœa acuminata* Townsend new species.

Differs from the other genera of the Leucostoma group by the following characters: Third and fourth abdominal segments of female successively much narrowed, constricting rapidly but evenly from the narrowing second segment; segments one and two very long, three

shorter, four very short and not glabrous. Female forceps meeting apically in a curve, armed with teeth, the closed forceps forming an almost perfect circle. Proboscis short and fleshy. Epistoma not projecting, vibrissæ a little above oral margin. Two strong verticals in female. Pair of strong reclinate ocellars. Lower border of head quite equalling the frontal length. Frontalia rather broad, occupying one third of frontal width in female. First three abdominal segments with marginal row of bristles, but the median marginal pair is differentiated from the rest in each case by being erect. Fourth segment with only fine hairs. Hairs of abdomen short. Femora thickened. Petiole of apical cell a little shorter than the hind crossvein.

Cyclodionæa acuminata new species.

Length of body, 5 to 5.5 mm.; of wing, 3 to 3.5 mm. Two females, Santa Clara county, California (Baker); and Plano, Texas, October (E. S. Tucker).

Black. Head silvery-white pollinose, epistoma yellowish, frontalia dark brown or black, antennæ blackish. Palpi fulvous. Thorax and scutellum shining, thinly silvery-white pollinose. Abdomen shining brown to blackish, not pollinose. Legs black. Wings clear. Tegulæ white.

Holotype, No. 19578 U. S. N. M., California.

MICROSCIASMA new genus

Genotype, *Microsciasma minuta* Townsend new species.

Differs from *Sciasma* Coquillett as follows: Vibrissal angles and oral margin on line with lower border of eyes, frontalia of male scarcely at all narrowed, arista shorter. Male abdomen subrounded in outline from above, but slightly longer than broad, arched, macrochætæ vestigial. Male claws much shorter than last tarsal joint.

Microsciasma minuta new species.

Length of body, 2 mm.; of wing, nearly 1.75 mm. One male, Grand Canyon, Arizona, near Colorado River on Hance Trail, about 3,500 ft., July 10, 1892 (Townsend).

Black, antennæ and palpi pale reddish-yellowish, frontalia reddish-brown. Mesoscutum, scutellum and abdomen polished, with slight greenish metallic lustre. Pleuræ polished brown. Femora brownish yellow, tibiæ and tarsi reddish-brown. Wings faintly yellowish-fuscous on costal third, tegulæ deeply yellowish-fuscous. Face, cheeks and parafrontals deep black, occiput shining black.

Holotype, No. 19579 U. S. N. M.

This is the smallest muscoid fly known to me.

NEW COLEOPTERA AND MISCELLANEOUS NOTES. III.

By CHARLES SCHAEFFER,

BROOKLYN, N. Y.

Family CARABIDÆ.

Calosoma irregulare new species.

Black, shining. Head rather coarsely vermiculately sculptured; front convex at middle, scarcely impressed on each side; antennæ about as long as head and prothorax together, outer joints with narrow glabrous space. Prothorax in its widest part nearly twice as wide as long; anterior angles rounded; sides arcuate in front, from a little before middle somewhat obliquely narrowing to the basal angles, which are rather slightly produced and rounded; surface convex, anteriorly on each side depressed; lateral margin not reflexed, except slightly near basal angles; marginal bead at sides a little stronger near base than at apex; surface rather coarsely confluently punctate, especially at sides and base. Elytra rather short, a little longer than wide, oval; humeri broadly rounded; sides evenly arcuate; lateral margin narrowly reflexed, not serrate basally; surface with twenty-two striæ, the striæ not punctate, these and the narrow, convex intervals irregularly interrupted almost as in *Cychrus obliquus* ssp. *convergens*. Hind tarsi slender, nearly as long as the tibiæ. Length from the anterior margin of prothorax to apex of elytra 15 mm.; width 8 mm.

Castella, California.

A peculiar and distinct little species. The head and prothorax are sculptured almost as in *discors,* but the sculpture of elytra is unique and is nearly as in *Cychrus obliquus* ssp. *convergens.* This species has also more elytral striæ (twenty-two) than any other species of *Calosoma* known to me. The type specimen has the lateral margins of elytra faintly bluish while another specimen in my collection has the margin concolorous.

Calosoma subasperatum new species.

Black, shining. Head moderately strongly punctate; punctures connected here and there by short transverse or oblique lines; frontal impression on each side deeply impressed; antennæ about as long as the head and prothorax. Prothorax in its widest part not quite twice as wide as long; sides arcuate in front, obliquely narrowing to the basal angles, which are moderately strongly produced; lateral margin distinctly reflexed and with about nine, erect setæ near the marginal bead; surface more densely punctate than the head, punctures at sides and along basal margin coarser and more or less confluent. Elytra oblong; humeri broadly rounded; sides evenly arcuate; side margin

narrowly reflexed; surface with distinctly impressed longitudinal striæ, which are on the disk, especially near base, punctate; intervals flat, more or less convex near side and towards apex; the transverse lines almost entirely absent on the disk but present at sides and at apex, tegulæ at sides and apex formed by the transversely impressed lines elongate, but shorter and somewhat acute or graniform at apex. Length 13 mm., width 7 mm.

California (coll. O. Dietz).

This species belongs to *luxatum* and allies and is principally distinguished from any of those known so far by the distinctly striate elytra.

Pterostichus caligans, Horn.

I received lately a specimen of this interesting species. By its large head, etc., it resembles *Pt. grandiceps* more than any other species and ought to be associated with it and not with *Pt. augustus.*

Family EROTYLIDÆ.

Scæother opacus new species.

Black, opaque, below piceous, tibiæ and tarsi paler, the first five antennal joints pale the others black. Head and prothorax moderately closely and not very coarsely punctate; third joint of antennæ about as long as the next two, which latter are equal, sixth joint smaller than fifth, seventh wider than sixth, eighth wider than sixth and rather strongly transverse, last three joints very much wider than the eighth and strongly transverse. Scutellum sparsely and finely punctate. Elytra with regular rows of moderate punctures; intervals irregularly, finely punctate. Beneath not coarsely nor closely punctate.

Arizona (coll. O. Dietz).

This looks very much like certain species of *Platydema* of the family Tenebrionidæ. The genus *Scæother* is closely related to *Mycotretus* from which it principally differs by its short, transverse mentum and the tibiæ scarcely dilated at apex. Only one species, *S. carbonarius* Champ., was known so far, which was described from Mexico. *S. opacus* seems to be very closely allied to *S. carbonarius* but the scutellum in the former is not "thickly punctulate as the rest of the upper surface," and the color of antennæ and legs are different.

Family CHRYSOMELIDÆ.

Plagiodera versicolor Laich.

Specimens which agree with the description of this European species were taken by Messrs. E. Shoemaker, Lewis B. Woodruff and Wm. T. Davis, commonly on willow on September 9, at Bull's Head,

Staten Island, N. Y. Mr. Charles Leng also informs me that his son found it abundantly in July at the latter locality and Mr. Davis has specimens in his collection from Clove Valley Staten Island, Aug. 3, 1911. In New Jersey it was found by Mr. E. L. Dickerson in a commercial nursery and by Mr. F. M. Schott at Moonachie, March 14, 1915.

Two species of *Plagiodera* as far as I know, occur now within the limits of the United States. The above-mentioned species *P. versicolor* Laich, and *P. thymaloides* Stal. The first has the upper surface blue, bluish-green or green, shining, the antennæ are black except the first five joints, which are brownish, the prothorax is more finely punctate than the elytra. *P. thymaloides* Stal. from Brownsville, Texas, is pale reddish-brown beneath, head and thorax of the same color except that the latter has a dark brownish central spot, the elytra are dark brown with a slight metallic tint and the lateral margins are pale reddish brown, the first five antennal joints are pale reddish brown, the others black, the prothorax is almost smooth at middle with a few moderately coarse punctures at sides, the elytra are relatively sparsely, irregularly punctate, the punctures rather coarse.

These two species are true *Plagiodera,* those listed in the Henshaw list under that name and in Blatchley's Coleoptera of Indiana belong in the genus *Phædon.* In *Plagiodera* the elytral puctuation is confused not in regular series, and the elytral epipleuræ are excavated, in *Phædon* the elytral punctuation is in regular series and the epipleuræ are not excavated.

Family TENEBRIONIDÆ.

Rhacius sulcatulus Champ. Biol. Cent. Am. Col., Vol. IV, pt. 1, p. 121.

A single specimen, collected by the late Ottomar Dietz in Brownsville, Texas, agrees with the description of this interesting Mexican species. It looks somewhat like a robust *Tenebrio castaneus* Knoch. The position of the genus *Rhacius* is rather doubtful; it seems to be near *Tenebrio* and allies but the absence of a coriaceous hind margin to the third and fourth ventral segments exclude it from the subfamily Tenebrioninæ.

Sitophagus hololeptoides Cast.

The late Ottomar Dietz took in Brownsville, Texas, a few specimens of this species which is widely distributed in tropical America from Mexico to Brazil and Cuba.

Doliema bidens new species.

Male.—Reddish-testaceous. Head finely and sparsely punctate at middle, the punctures coarser at sides; the front on each side broadly produced, truncate at apex but with a narrow tooth-like prolongation at middle; epistoma rather large, depressed and on each side broadly, obliquely impressed, emarginate-truncate at apex. Antennal joints three to eight longer than wide. Prothorax transverse, sides arcuate and distinctly narrowing to the hind angles which are acute; surface sparsely and finely puctate at middle, more coarsely at sides; basal fovæ rather deeply impressed. Elytra elongate, parallel, finely and sparsely punctate, lateral carina distinct. Ventral segments one to three somewhat coarsely punctate, the last two finely punctate. Length 4.5 mm.

One specimen from Florida collected by the late Ottomar Dietz.

This species differs from *pallida* and *plana* besides the different form of processes at the sides of the head and large epistoma of the male, by the longer antennal joints especially the third and fourth and also by slightly narrower form.

Anædus pallidus new species.

Dark ferruginous. Head sparsely, coarsely punctate, transversely impressed in front. Antennæ ferruginous, third joint scarcely longer than second, which is very small and transverse, both joints together about as long as the fourth joint. Prothorax transverse; apex feebly emarginate; anterior angles rounded; sides broadly rounded at apical half, then obliquely narrowing to the hind angles, which are obtuse; surface with coarse, irregularly placed sparse punctures. Scutellum smooth. Elytra coarsely, irregularly punctate, the structures not as close as in *brunneus,* each puncture with a short erect, pale hair. Underside shining; tibiæ and tarsi slender. Length

Brownsville, Texas.

This species differes from *brunneus* in having the sides of prothorax not sinuate before the hind angles, the hind angles not prominent, the third antennal joint shorter than in *brunneus* and the thorax and elytra less densely punctate. *A. texanus* Linell, described from the same region, is larger and differs from the above described species and *brunneus* in having the third antennal joint as long as the fourth, the thorax with large basal fovæ near hind angles and the first joint of hind tarsi longer than the following three joints. *A. rotundicollis,* which I do not know, is said to have a less transverse prothorax than *brunneus* and is apparently similar to *pallidus* but the base in *rotundicollis* is said to be truncate and the hind angles a little prominent.

A NEW CICADA FROM ARIZONA.

BY WM. T. DAVIS,

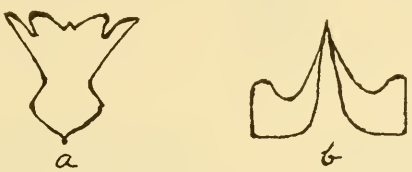
NEW BRIGHTON, STATEN ISLAND, N. Y.

Through the kindness of officials connected with the Biological Survey, U. S. Department of Agriculture, I recently had the opportunity of examining a small collection of Cicadas from various parts of the United States, and among them was the new species here described.

Cicada cultriformis new species.

Type male, Blue River, a branch of the Gila River in Greenlee Co., Arizona, August 25, 1914. E. G. Holt, collector. (Collection U. S. Biological Survey.)

Resembles *Cicada marginata* Say in size, color and markings. Head black with an oblong greenish yellow spot each side between the eyes and a small spot of the same color on the front just above the transverse rugæ. Pronotum greenish yellow with a large, conspicuous black spot occupying the fore part of its central area (see Fig. *a*). The hind margin of the pronotum (collar) is entirely unicolorous as in *marginata*. The mesonotum is black, with a pruinose band each side at the base of the wings; the elevated x is greenish



yellow, and there are two conspicuous, irregularly formed (pipe-shaped) greenish yellow spots occupying its central portion (see Fig. *b*). The tergum is black, each side broadly margined with pruinose, and the segments have their posterior margins yellowish. There is also an indication of a dorsal line of pruinose spots on the tergum, which in the type have been nearly worn off. Beneath the head is blackish, the remainder of the insect being greenish yellow and more or less pruinose. The costal margin of the fore wing is entirely greenish yellow, darkened beyond the middle, and the w-mark is inconspicuous. Both fore and hind wings are greenish yellow at base, with the veins darkened beyond the middle.

In genitalia *Cicada cultriformis* is widely different from *Cicada marginata*. The dorsal piece is one third broader, as may be seen in the accompanying figures. The uncus is rather broad with the extremity truncate; it is more

narrow and rounded in *marginata*. But the greatest differences are in the lower pieces into which the uncus locks, which are 5 millimeters long in *cultriformis*, and when seen in profile are shaped like the blade of a pruning knife, hence the name. In *Cicada marginata* these same pieces are about 2.5 millimeters in length and not shaped at all like those of *cultriformis*.[1] The costal margin of the fore wing in *cultriformis* is evenly rounded and not so suddenly bent as in *marginata*, and the opercula, which are broadly rounded at the extremities in both species, are larger.

Allotype, female; bears the same date as the type. It is in the author's collection.

It has the same large, conspicuous black spot on the pronotum as the type, and the two central, large, pipe-shaped spots on the mesonotum are as well defined and of the same shape. The specimen was killed before it was mature and before its colors had completely developed.

MEASUREMENTS (IN MILLIMETERS).

	Male Type.	Female Allotype.
Length of body	40	38
Width of head across eyes	16	17.5
Expanse of fore wings	110	125
Greatest width of fore wing	17	19
Greatest width of operculum	9	

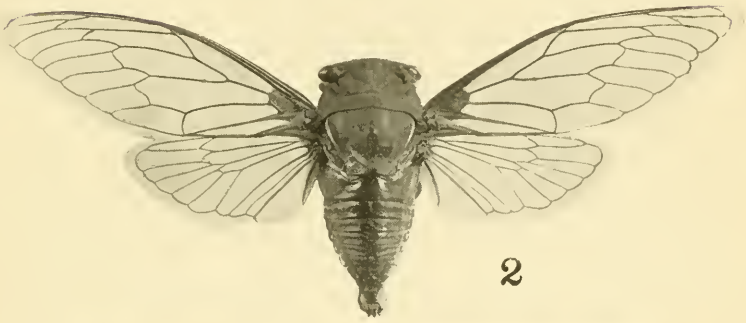
The species here described is one of our largest cicadas, and while it may be readily distinguished from its nearest known allies by its peculiar genitalia, we think that the large, black spot on the pronotum will also prove of specific value.[2] The outer lines of the bowls of the pipes in the pipe-shaped spots on the mesonotum, run parallel in *Cicada cultriformis* both in the type and the allotype, which they do not do in Haldeman's figure of *Cicada rcsh* and in about two hundred specimens that we have identified as that species from Texas and Oklahoma. The markings of *Cicada rcsh* differ in other respects, and it is also a much smaller insect.

As the figure of *Cicada marginata* Say published in this JOURNAL for March, 1915 (Vol. XXIII, Pl. 2, fig. 1) was not quite satisfactory, we herewith present a second one. The insect from which it was taken

[1] By coloring them white Mr. H. H. Cleaves brought out the differences more clearly in the photographs from which the figures were made.

[2] Since the above description was written a female *Cicada cultriformis* from Verde Valley, Arizona, August 1, 1913, A. W. Murrill collector, (Collection U. S. Nat. Museum), and a male labeled "Arizona" in the Uhler collection, U. S. Nat. Museum, have been examined. In size and markings they closely resemble the type and allotype as described.

1



2

3

4

Cicadidæ.

came from Chetopa, Kansas (D. R. Beardslee) and expand 120 millimeters. This is supposed to be not a great many miles from the type locality. *Cicada marginata* has sometimes a line of pruinose spots on the tergum, but generally these spots are inconspicuous or have been entirely obliterated by age. In specimens of the same size the eyes are much furthr apart in *marginata* than they are in the allied *Cicada dealbata* described in this JOURNAL for September, 1915.

EXPLANATION OF PLATE XVIII.

Fig. 1. *Cicada cultriformis* Davis, reduced.
Fig. 2. *Cicada marginata* Say, reduced.
Fig. 3. *Cicada cultriformis;* genitalia, enlarged.
Fig. 4. *Cicada marginata;* genitalia, enlarged.

TWO NEW SPECIES OF ARRHENOPHAGUS WITH REMARKS.

BY A. A. GIRAULT,

WASHINGTON, D. C.

The genotype of this genus heretofore has been supposed cosmopolitan. It has been recorded from many parts of the earth, including Asia and Australia. But in Australia there are two distinct species, one described, which belong to *Arrhenophagoidea* a genus which differs from *Arrhenophagus* in bearing **5-jointed tarsi** only. All other specimens which I have seen from that region are the genotype of this second genus. Ceylonese and Japanese specimens of *Arrhenophagus* represent the two species below but North American specimens appear to be *chionaspidis.* The club is **solid** (in spite of all statements to the contrary).

1. **Arrhenophagus albitibiæ** new species.

Female.—Length 0.40 mm.

Like the genotype but all tibiæ and tarsi are white, the antennæ are yellowish white. The venation is pale at tip, not ending in a small dusky spot.

Described from four females on a slide in the U. S. N. M., labelled "*Arrhenophagus chionaspidis.* 1418. *Fiorina saprosema* Green. From male scales. Handy, Ceylon, Koebele."

Types—Catalogue *No. 19882*, U. S. N. M., the above specimens on a slide.

2. **Arrhenophagus albipes** new species.

Female.—Length 0.40 mm.

Differs from the preceding in that all of each leg is white and the venation terminates in a small, fuscous area. Face yellowish.

Described from four females labelled as previously and "1389. *Chionaspis eugeniæ* Mask. On female scales. Hong Kong, China, Koebele."

Types—Catalogue *No. 19883*, U. S. N. M., the above specimens on a slide.

A second slide bearing many specimens labelled "Parasite of orange scurvy scale from Kiomachi, Gifu. Japan (Nawa), January 30, 1899." And another one labelled "1407. *Diaspis brasiliensis*. On fern, Jamsui. A. Koebele."

ON DIFFERENTIAL INCIDENCE OF THE BEETLE BRUCHUS.

By J. Arthur Harris,

Cold Spring Harbor, N. Y.

Introductory Remarks.

Beetles of the genus *Bruchus* subsisting upon the seeds of *Phaseolus, Pisum, Vigna, Vicia* and other cultivated legumes may deposit their eggs upon the young pods through which the newly hatched larvæ penetrate to the developing seed or upon the matured seed itself. *B. obtectus*, the common pest of the bean *Phascolus vulgaris* may develop in either manner. The purpose of this note is to consider the question whether when the eggs are laid on the young pods the frequency of parasitization is in any degree determined by the characters of the pod.

The assembling of the data here presented was begun in an effort to explain certain anomalous results obtained in physiological studies of seed weight in garden beans. Since these purely botanical ques-

tions may be taken up in detail later they need not be outlined here.

I shall consider:

(*a*) The relationship between the number of ovules per pod and the relative number of seeds parasitized by the beetles.

(*b*) The relationship between the number of seeds matured per pod and the number infested by beetles.

(*c*) The relationship between the position of the seed in the pod and the incidence of the insects.

MATERIALS AND METHODS.

Unsystematized records of the incidence of the beetles are furnished after a sufficient lapse of time by the seeds themselves.

It would of course be most convenient if the pods could be preserved unopened and all the records made at one time after the emergence from the seeds of all the insects. There is, however, no reason to assume *a priori* that the insects will develop normally and emerge in full numbers in seeds remaining in the pods. Experimentally there is some evidence against such an assumption. Hence the seeds must be removed from the pods and be preserved individually with records of any of the pod characters which are to be considered.

Materials which seem to be free from pertinent objections are furnished by two lots each of several thousands of pods from my experimental cultures. One of these is a series of Golden Wax beans grown at Lawrence, Kansas, in 1906. The other is a culture of Burpee's Stringless made in the Missouri Botanical Garden in 1907.[1]

The pods of these were shelled in the fall or early winter after they were harvested. Each seed was labelled individually with a record of the characteristics of the pod from which it was taken. Such seeds as showed the presence of weevils were so designated. After some months the seeds were gone through again and other supplementary records of the occurrence of beetles were made.

The tabulation of the characteristics of the pods from which these seeds come in comparison with these of the whole series of seeds produced gives the information sought.

[1] Those who desire may obtain further information concerning the characteristics of these plants in other papers by the writer in which they are referred to by the key letters LL and GG.

DISCUSSION OF DATA.

Problem I.—Relationship between the Number of Ovules formed per Pod and the Percentage of Parasitized Seeds.

In Tables I–II are shown the number of ovules formed per pod, the total number of seeds matured and the number infested by weevils.

The most logical method of comparing the numbers of infested seeds in pods with various numbers of ovules is to reduce actual frequencies to percentages for each class of pods, *i. e.*,

$$\frac{\text{Infested seeds} \times 100}{\text{Total seeds}}$$

as given in the fourth column.

TABLE I.

INFESTED SEEDS IN GOLDEN WAX BEANS.

Ovules per Pod.	Total Seeds.	Infested Seeds.	Per Cent. Infested.	Seeds Weighed.	Ratio to Weighed.
2	94	36	38.30	21	1.714
3	438	152	34.70	87	1.747
4	2,723	1,116	40.98	527	2.118
5	9,998	4,462	44.63	1,973	2.262
6	7,324	3,600	49.15	1,264	2.848
7	636	367	57.61	66	5.561
	21,213	9,733	45.88	3,938	2.472

TABLE II.

INFESTED SEEDS IN BURPEE'S STRINGLESS BEANS.

Ovules per Pod.	Total Seeds.	Infested Seeds.	Per Cent. Infested.	Seeds Weighed.	Ratio to Weighed.
4	768	37	4.82	421	.088
5	3,958	343	8.67	1,958	.175
6	7,657	865	11.30	3,393	.255
7	4,959	568	11.45	1,996	.285
8	1,233	166	13.46	510	.323
	18,575	1,979	10.65	8,278	.239

In both series the frequency of injury by weevils increases as the number of ovules per pod becomes larger. There is only one ap-

parent exception: In the Golden Wax series the incidence of insects in pods with the lowest number of ovules here recorded is slightly higher than in the next higher ovule grade. The result is probably quite accidental and attributable to the fact that in these two classes relatively few pods and seeds were available. This point will be taken up below.

While the ratio of injured seeds to total seeds formed is the most logical basis of comparison, it has seemed desirable to test the results in another way. I have therefore taken the ratio

$$\frac{\text{Total Infested Seeds}}{\text{Total Seeds Weighed}}$$[1]

for each class of pods. This purely arbitrary but useful ratio is shown in the final column of the tables. The results fully substantiate the conclusions to be drawn from the preceding method.

The trustworthiness of any percentage frequency of course depends upon its numerical magnitude and upon the number of observations upon which it is based. To determine whether the deviations from the general percentage found in the case of pods with various numbers of ovules are statistically trustworthy one may calculate the extreme range in percentage of infested seeds which one might reasonably expect to occur as a result of random drawings of samples as large as these actually considered for the particular class of pods from a series of seeds showing the percentage incidence observed in the whole material. If the observed percentages for the several classes of pods fall well outside these limits, it is clear that the deviations may be looked upon as significant.

Let N be the total number of seeds examined, Nw the total number infested by weevils. Then $Nw/N = p$, the proportion of the injured seeds. The proportion of seeds not infested by weevils is $1 - p = q$. Assuming that our general series of seeds is large enough to give trustworthy values to p and q the standard deviation of any class of seeds may be taken to be $\sqrt{mpq}$, or the standard deviation of the percentage ratio $100\sqrt{mpq}/m$, where m is the number of seeds examined in the class.

In the graphs the limits of twice the standard deviation above and

[1] Numbers of seeds from each of these series were weighed individually for breeding purposes. These were drawn quite at random.

below the population percentage has been indicated by shading in the area bounded by imaginary draughtsmen's curves smoothing the calculated standard deviations about the general percentage line. The chances are about 20 to 1 against purely random deviations falling outside the shaded areas.

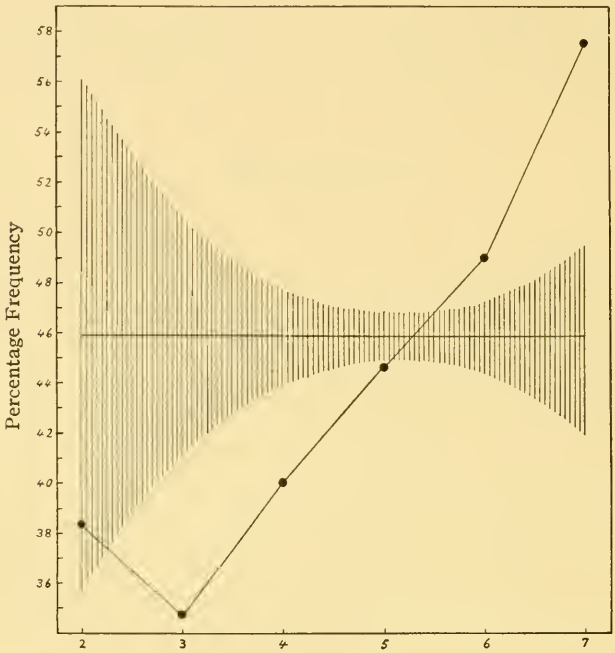


Diagram 1. Percentage of Seeds infested by *Bruchus* in a Golden Wax culture in general and in pods with various numbers of ovules. The general percentage is shown by the central bar, that for the various pod classes by the heavy dots on the ordinates for ovules. The shaded area gives the range of twice the standard deviation of random sampling for samples of the size dealt with. Note that all but one of the percentages for individual ovule classes fall well outside this area.

The diagrams show with great conclusiveness not only that the percentage frequencies of parasitization actually observed in the individual ovule classes differ from the average and that these percentages increase from the lower to the higher ovule grades with considerable regularity, but that for the most part the deviation of these percent-

ages from the average condition is so great that they must unquestionably be regarded as statistically trustworthy. Only in the case of the lowest ovule class of the Golden Wax series is there an exception to

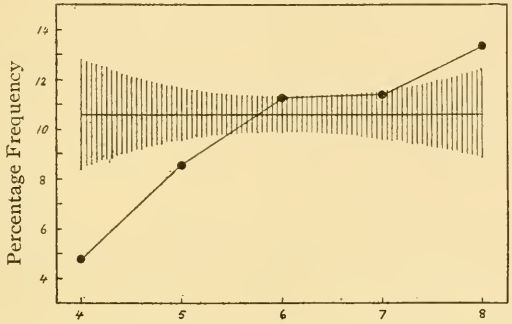


Diagram 2. Relationship between number of ovules per pod and parasitization by *Bruchus* in Burpee's Stringless beans. See Explanation of Diagram 1.

the rule of an increase in percentage of parasitization from lower to higher ovule grades. The graph shows by the enormous extent of the shaded area at the point of two ovules per pod that the probable

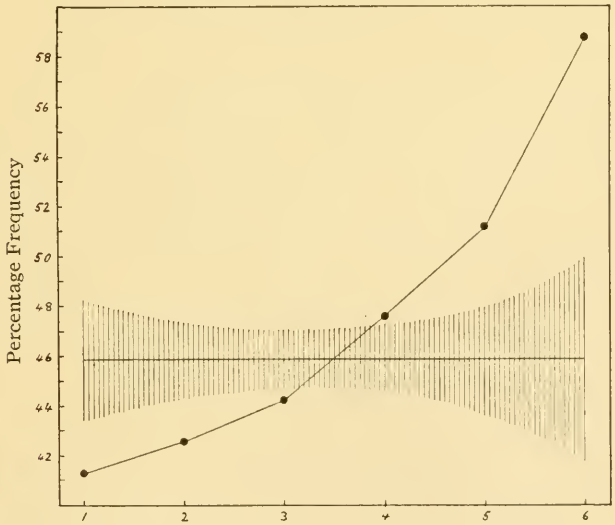


Diagram 3. Relationship between number of seeds matured per pod and parasitization by *Bruchus* in Golden Wax beans.

error for this class of pods is very high indeed. As a matter of fact this empirical percentage is the only one which falls well inside the zone of possible untrustworthiness. Even it lies far below the line indicating the general condition.

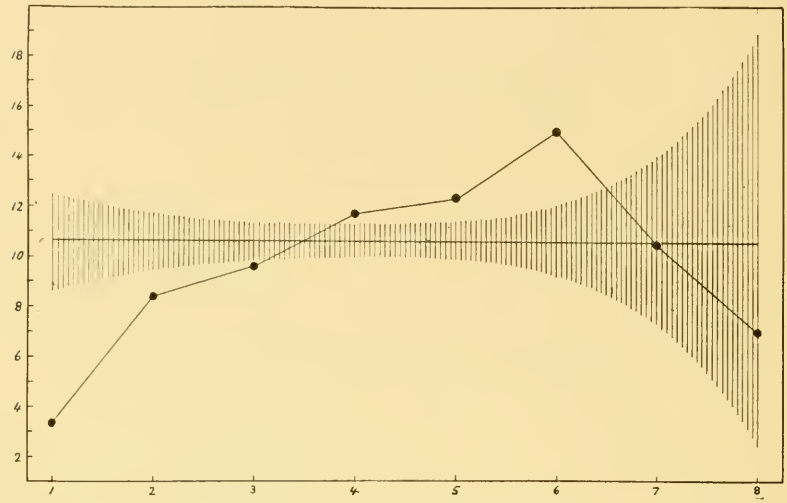


Diagram 4. Relationship between number of seeds matured per pod and percentage frequency of weevils in Burpee's Stringless beans.

Problem II.—Relationship between the Number of Seeds Matured per Pod and the Percentage of Infested Seeds.

In Tables III–IV the records for the seeds have been arranged according to the number of seeds developed per pod instead of the number of ovules originally laid down. The method of computation is the same as that employed in the preceding tables. The graphs, 3–4, are prepared in a manner similar to those described above.

The tables and graphs show the same kind of relationship for number of seeds as for number of ovules per pod. As the number of seeds matured per pod becomes larger the percentage of the seeds which are infested by weevils increases.

In the Golden Wax series the curve of increase in percentage of parasitization from pods with the lowest to the highest number of seeds matured is remarkably smooth. In the Burpee's Stringless material the increase is not quite so regular. Indeed there is an apparent

TABLE III.

INFESTED SEEDS IN GOLDEN WAX BEANS.

Seeds per Pod.	Total Seeds.	Infested Seeds.	Per Cent. Infested.	Seeds Weighed.	Ratio to Weighed.
1	1,649	681	41.30	349	1.951
2	4,666	1,987	42.58	936	2.123
3	6,114	2,706	44.26	1,143	2.368
4	5,228	2,491	47.64	945	2.636
5	2,950	1,512	51.25	502	3.012
6	606	356	58.75	63	5.651
	21,213	9,733	45.88	3,938	2.472

TABLE IV.

INFESTED SEEDS IN BURPEE'S STRINGLESS BEANS.

Seeds per Pod.	Total Seeds.	Infested Seeds.	Per Cent. Infested.	Seeds Weighed.	Ratio to Weighed.
1	1,071	46	4.30	548	.084
2	3,052	259	8.49	1,610	.161
3	4,596	441	9.60	2,280	.193
4	4,408	518	11.75	1,925	.269
5	3,195	396	12.39	1,222	.324
6	1,770	266	15.03	576	.462
7	427	45	10.54	97	.464
8	56	8	7.00	20	.400
	18,575	1,979	10.65	8,278	.239

decrease in pods with 7 and 8 seeds. Here, however, the number of seeds available is small as compared with the other pod classes; as the graphs show, these aberrant percentages fall within the limits of twice the standard deviation from the general percentages, and hence cannot be given too much weight.

The facts presented in the preceding paragraphs show beyond reasonable doubt that the incidence of the so-called bean weevil is not purely random, but that it is to some extent determined by the character of the pods in which the seeds are borne. In pods with larger numbers of ovules and in those with larger numbers of seeds the percentage frequency of infested seeds is higher. One might expect that if one and one only of the two characters of the pod here considered, *i. e.*, number of ovules and number of seeds, were the determining factor in the differential parasitization of the seeds there would nevertheless be some relationship between the other pod char-

acter and incidence of parasites. Thus suppose that the factor which determined the differences in the frequency of parasitization of pods of different classes were number of ovules formed per pod, and that the number of seeds developing had no independent influence in determining whether a seed should or should not be parasitized. Nevertheless on tabulating his data according to number of seeds per pod one would actually find the percentage frequency of parasitism to some extent dependent upon, or modified by, the number of seeds matured per pod, for the simple reason that the number of seeds matured is within limits determined by the number of ovules originally laid down.

The problem of differentiating these two factors is in the present case one of some complexity, and demands for its final solution further observations of various kinds.

One may make some progress by a two-fold classification of the data already in hand. By sorting the records for the individual

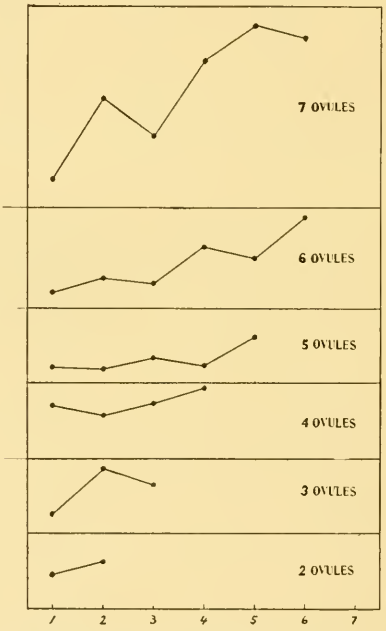


Diagram 5. Relationship between number of seeds matured per pod and percentage frequency of *Bruchus* for pods with various numbers of ovules. Golden Wax beans.

seeds first into classes according to the number of ovules formed per pod, and then sub-sorting each ovule class according to the number of seeds which its pods mature, one may ascertain whether there is a relationship between number of seeds maturing and relative numbers parasitized independent of that between the number of ovules formed and the incidence of the parasites.

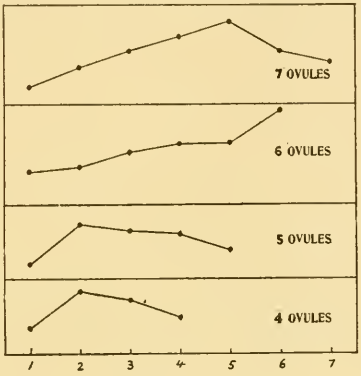


Diagram 6. Relationship between number of seeds matured per pod and percentage frequency of *Bruchus* for pods with various numbers of ovules. Burpee's Stringless beans.

The results can best be presented graphically in diagrams 5 and 6. Here the percentage of parasitization in pods with different numbers of seeds matured is shown for pods with each class of ovules separately.

The results are very irregular just as one would expect when the data are split up into such numerous sub-classes. There seems, however, to be a distinct tendency for a higher percentage of parasitization to occur in pods with larger numbers of seeds, even when the number of ovules is made constant by working with pods all having the same number of ovules. Thus number of seeds matured seems to be of independent, though probably of minor, significance in determining frequency of parasitization. Further than this the analysis cannot be pushed at present.

Problem III.—Relationship between the Position of the Seed in the Pod and the Percentage of Parasitized Seeds.

At the beginning of these studies an entomological friend sug-

gested that the factor most likely to influence the distribution of the weevils among the seeds would be their position in the pods.

The data have been tabulated to test this point, but I can find no trustworthy evidence of any such relationship.

RECAPITULATION AND DISCUSSION OF RESULTS.

The purpose of the foregoing paragraphs is the presentation of certain matters of fact concerning the relationship between the characteristics of the pod of the common bean, *Phaseolus vulgaris,* and the relative frequency of parasitization by the so-called bean weevil, *Bruchus.*

The results of the examination of the extensive series of data representing two quite dissimilar horticultural varieties comprising 6,233 and 8,018 pods producing 18,575 and 21,213 seeds respectively show that the chance of occurrence of a weevil or of weevils in a seed is to some degree dependent upon the number of ovules laid down and upon the number of seeds developing in these pods.

In pods with larger numbers of ovules the relative number of the seeds which are weevil infested is greater.

Percentage of parasitization also increases as the number of seeds matured per pod becomes larger.

Since number of seeds matured and number of ovules formed per pod are positively correlated[1] *i. e.,* since pods with larger numbers of ovules produce on the average larger numbers of seeds, a relationship between either of these characters and the incidence of weevils would necessarily result in some relationship between the other character and frequency of parasitization, even though there were no direct causal relationship between them.

It is difficult to differentiate and to measure the independent influence of these two characters upon the incidence of the insects.

Apparently the number of seeds matured has some influence independent of that of the number of ovules per pod with which it is correlated. Since this relationship seems to be slight, it is probable that the number of ovules laid down is the primary factor.

The most reasonable hypothesis in explanation of the observed relationships would seem to be that in the young pod size is corre-

[1] Harris, J. Arthur, Arch. f. Entwicklungsmech. d. Organism., 35: 500–522, 1912.

lated with the number of ovules formed and the number of seeds which are beginning to develop, just as they are known to be in matured pods of other forms,[1] and that in consequence the maintenance of a foothold and ovoposition are easier in such pods. That is, however merely a suggested hypothesis which must be confirmed or disproved by actual behavior studies.

No relationship between the position which a seed occupies in the pod and its liability to parasitization has as yet been demonstrated.

MISCELLANEOUS NOTES.

Shooting Insects with a Bean-Shooter.—The easiest way to collect some cicadas is to shoot them with fine shot. But the carrying of a pistol for the purpose is apt to get one in trouble in some communities, for in many places a license to carry firearms is required. As yet there is no such restriction on carrying a bean-shooter, and when properly made it can be used most effectively in collecting certain wary insects, like several species of dragonflies. The bean-shooter or sling, is made with the forked stick and rubber bands in the usual way, but the leather bag should have a well secured stitch on each end, so that it will hold several hundred fine shot. Armed with this contraption the entomologist may repair to the side of a pond or stream, and as some desirable though tantalizing dragonfly sails by just out of the reach of the ordinary net, it may be shot on the wing. The insect will probably fall into the water, but may be rescued with a long stick, or one can go in wading for it. If a dragonfly keeps out of the reach of a net to its own advantage, it generally does another thing greatly to its disadvantage, and that is, it will repeatedly fly by the same spot, thus giving the collector several chances.

With a bean-shooter made after the above described plan, the writer this past summer shot a number of dragonfles, both on Long Island and on Staten Island, and only in two instances were the insects at all damaged. In the majority the effects of the shot were not noticeable.

As to the shooting of cicadas, a correspondent to whom I had

1 Harris, J. Arthur, Bot. Gaz., 50: 117–127, 1910; *loc. cit.*, 53: 204–218, 396–414, 1912.

recommended this mode of collecting, writes that he used an old gun loaded with powder and dry sand. The insect he says is often only stunned, and falls out of the tree, but before it can recover itself sufficiently to fly away, it may be picked up and bottled.—

WILLIAM T. DAVIS.

Coccinella transversoguttata, Trichodes nuttalli, and Malachius æneus.—*Coccinella transversoguttata* was found on Staten Island in July, 1915, by C. W. Leng, Jr., and has also been found at Deep Pond, near Wading River, Long Island, by Wm. T. Davis. Its range has long been known as transcontinental in northern regions; but appears by the records cited and others made by Lewis B. Woodruff to actually extend southward as far as New York City. It has already been noted as occurring, though not common at several localities in Connecticut (Conn. Exp. Sta. Bull. 181) by Dr. W. E. Britton.

Trichodes nuttalli is another northern species which was found on Staten Island in July by C. W. Leng, Jr. The single specimen was found while sweeping the low meadows between Grasmere and South Beach in company with Wm. T. Davis. The species is not uncommon in the northern part of the state and has been taken by R. P. Dow in Sullivan Co., and in Ulster Co.

Malachius æneus. To the distribution records for this species may be added White Plains, N. Y., June, one specimen found by Mr. J. R. de la Torre Bueno, and Batavia, N. Y., abundant, found by Mr. H. H. Knight.—C. W. LENG.

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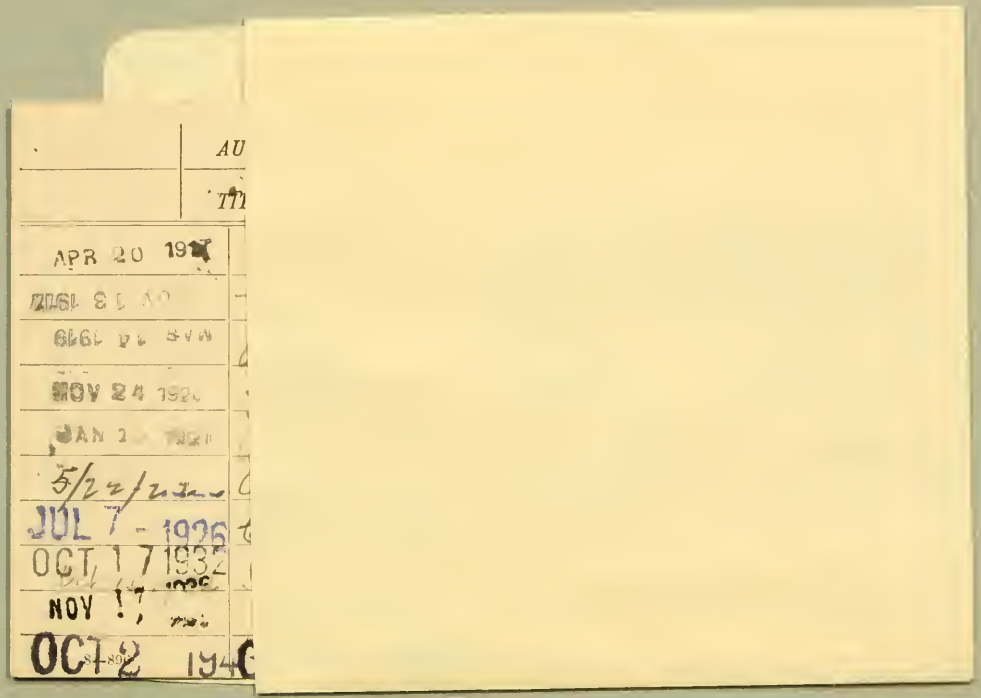

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